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PREHISTORIC ART; OR THE ORIGIN OF ART AS
MANIFESTED IN THE WORKS OF
PREHISTORIC MAN.

BY

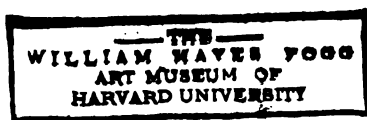
THOMAS WILSON,

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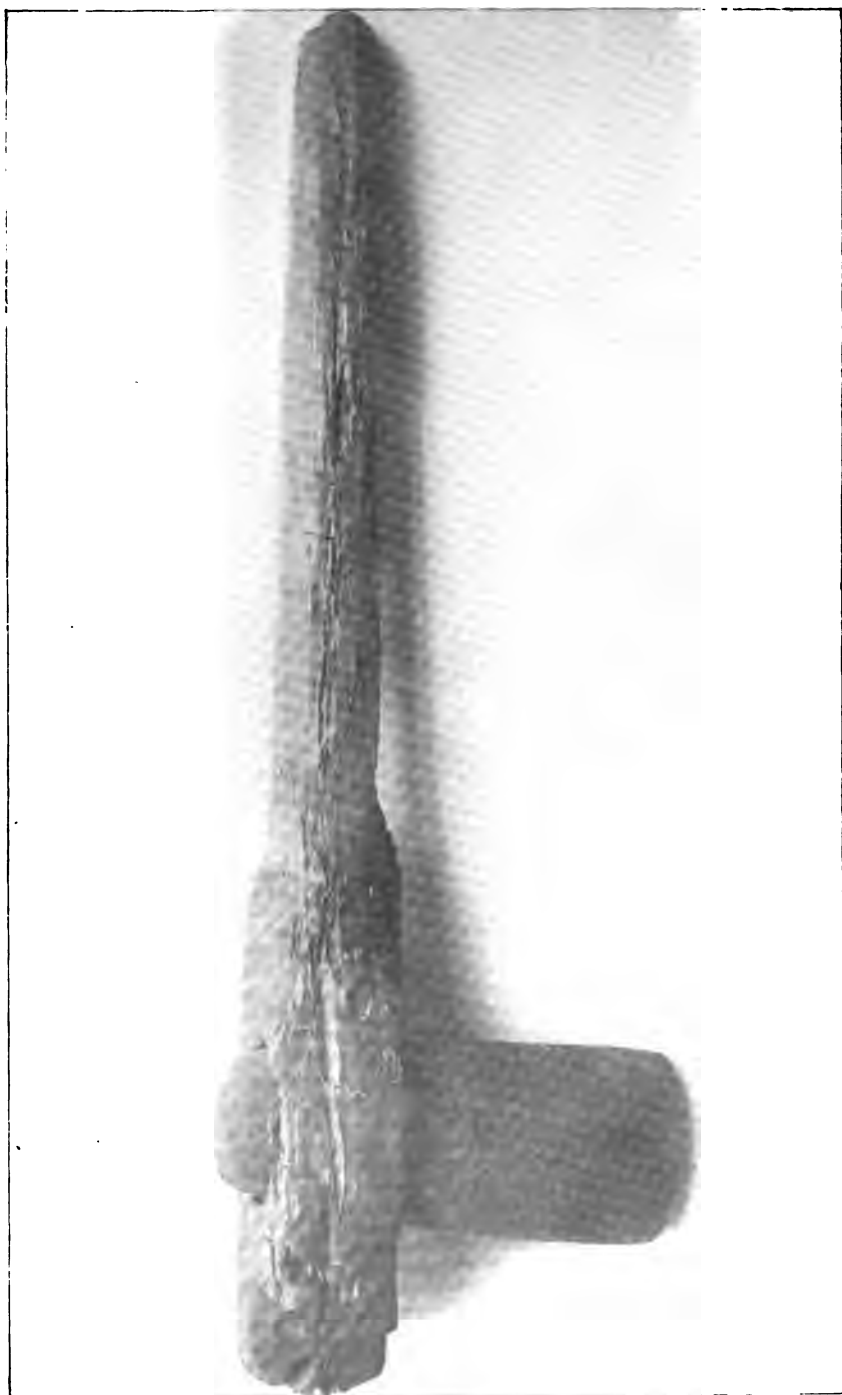
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Oct. 19, 1915.



ABORIGINAL AMERICAN POLISHED STONE HATCHET IN ITS ORIGINAL WOODEN HANDLE.
Collection of Byron E. Dodge, Richfield, Genesee County, Michigan.

PREHISTORIC ART;
OR,
THE ORIGIN OF ART AS MANIFESTED IN THE WORKS OF PREHISTORIC MAN.
BY
THOMAS WILSON,
Curator, Division of Prehistoric Archaeology, U. S. National Museum.



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PREHISTORIC ART; OR, THE ORIGIN OF ART AS MANIFESTED IN THE WORKS OF PREHISTORIC MAN.

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INTRODUCTION.

Art and science have, in these later days, come to be closely connected. Artists of all countries and periods are conditioned by the circumstances in which their lives are passed, and by the ideas prevalent among their peoples. Thus Art history becomes a function of social history, and can not wisely be disregarded by the student of the history of the human race. Ancient works of art bring us into contact with bygone peoples, and are often the only avenue whereby we can approach far-distant civilizations lying silent on the verge of time. Thus the study of Art history becomes a branch of Scientific inquiry. It has to be pursued by Scientific methods. Its results are of Scientific importance. It is a chapter, and perhaps the most pregnant chapter, of the Science of (Prehistoric) Anthropology, which seems destined in the near future to no insignificant growth. (Conway: "Art and Science.")

Art is the manifestation of human emotion externally interpreted by expressive arrangements of line, form, or color, or by a series of gestures, sounds, or words, governed by particular rhythmical cadences.¹

Art is the harmonious expression of human emotion.²

These definitions are general, and include all kinds of art. Emotions, whether grave or gay, are thus manifested or interpreted; when by color, the art is painting; when by line, drawing or engraving; when by form, sculpture; and a combination of these may produce architecture. When the emotion is manifested by gesture or rhythmic movement it produces the dance; when by rhythmic notes, music; when by rhythmic words, poetry. These are the exterior signs by which the human emotions are manifested.

Each art is the peculiar language of a more or less extensive category of ideas and sentiments, to which it alone is able to give adequate expression.

Certain of the arts appeal to the brain through the organ of sight—painting; sculpture, engraving, architecture, and the dance; while certain others appeal through the organs of hearing—poetry, music, and

¹Thoré, Salon de 1874, title Delacroix; Véron, *Æsthetics*, p. 89.

²W. J. Stillman, "Old Rome and the New."

the drama. In the former group, action is arrested and the representation is confined to a single moment of time; in the latter, the action is continuous.

But the laws governing both groups are the same. Their success requires concord and harmony between the external vibrations and the nerves which convey the impressions to the nerve centers.

A work of art is a material expression of its maker's delight. It excites the nerve centers and produces the sensations of delight or pleasure. We see or hear the artist's ideal through his work, and the success of his effort as a work of art depends, first, upon the brilliancy and clearness of his perception of his ideal, and, second, on his ability to translate and render this perception correctly. A copy, however accurate, even of the most beautiful scenes in nature, is not art. No artist can hope to equal the faithfulness of the photograph in reproduction, yet this is only the art of photography. A work of art is the ideal of the artist. It is his own thought; is a part of himself. Not nature as it actually is, but as he sees it, as he idealizes and then depicts it. It is this presentation of the ideality of artistic genius, whether in picture, statue, poem, music, the dance, in architecture, or what not, that stamps the work as one of art, and herein it differs from a mere mechanical copy, however accurate. It is this ideality of artistic genius which produces the sensation of delight.

Art is susceptible of several divisions. The commonest division is into fine, decorative, and industrial. It is not the intention of this paper to treat of industrial art *per se*. Fine art deals with painting, drawing, engraving, sculpture, architecture, music, poetry, and the drama. A division into prehistoric fine art may be made according to the material employed. Prehistoric decorative art explains itself.

The word "art" has different significations, according as it is used in the singular or plural form. When used in the singular form it relates to fine art; when in the plural, to industrial art. This linguistic distinction is continued in the designation of the workman; the one is an artist, the other an artisan. Sculpture in marble is undoubtedly a fine art, and the sculptor is an artist. Suppose his marble sculpturing is used for a magnificent chimney front in one of the mediæval châteaux of Europe, or his sculpturing in wood is used for a piece of furniture. It may then be either fine or industrial art, the line between them being extremely difficult to trace. The test of utility does not satisfy the conditions. Raphael's celebrated cartoons were designed for tapestries; Rubens made designs for similar purposes. Many recognized artists devote their best talents to making decorative designs for furniture, textiles, pottery, wall papers, book covers, and binding; while others equally well recognized find regular employment in illustrating our magazines and books; yet these are all industrial arts.

No attempt will be made to maintain the distinction between fine arts and industrial arts, nor to determine where the work of the artist

leaves off or that of the artisan begins. The work of the artisan is often quite as difficult to perform as that of the artist. It affords him as much pleasure; he takes as much pride in it, and puts as much sentiment into it, as does the artist. Nor can the test of utility be better applied, for some of the fine arts are highly utilitarian, while some of the industrial arts may be the reverse. If utility is to be the test, the lace maker, whether of point or bobbin laces, should be classed as an artist, for her work is always ornamental in contradistinction from utilitarian. It is only by this test that the sardine fish nets of western France are not to be classed as lace.

The idea sought to be presented is the extreme difficulty in distinguishing fine art from industrial art, the artist from the artisan; and the reader of the following pages is asked not to be critical in the author's application of the word "art."

Not infrequently a piece of work begins in industrial art and ends in fine art. The decorations in the Congressional Library building in Washington are examples. Much of the work began with the stone-cutter and was finished by the sculptor; much of the wall decoration must have begun with the whitewasher and ended with an aggregation of the best artist painters in the country. The mosaic work also ran the entire gamut of art. So it may be in many of the arts mentioned in this book. The work may have begun with the rudest mechanism, as in flint chipping, and ended in specimens of great beauty, requiring the highest skill, representing sentiment or imagination, being purely ornamental, without utility, and intended to satisfy an æsthetic demand. In these the dividing line between fine art and industrial art is not attempted to be maintained, nor is this at all necessary. A manifestation of a high order of industrial art by prehistoric man comes equally within the scope of this paper as though it were recognized fine art.

Sir John Collier, in his "Primer of Art," says that decorative art is the making of something to please the eye, but as to what is pleasing, that each person must decide for himself. With this definition for a basis, about all we can say is that the objects made by the prehistoric man pleased him and he desired them. All beyond is mere theory—at least is to be referred to psychology for an answer. To answer why he desired these objects to be beautiful in addition to their being utilitarian would be only speculation on our part.

Professor Haddon, in his work on "Evolution in Art," says that the most satisfactory method of procedure when dealing with difficult problems is to reduce them to their simplest elements and then investigate these simple elements before studying their more complex aspect. The author has proceeded along the lines of this advice. He has thus far taken not only a single people, but has taken them in a single locality, and has given all procurable evidence bearing on their art work, whether in its material or psychologic aspect. Through this we

are now in possession of all the information at present obtainable. Much more might be said of the man of the Paleolithic period in relation to his industry, his technology, possibly his sociology; but on the subject of his art and art work it is believed that the present paper will be found exhaustive. It furnishes the foundation upon which theory and speculation may be built ad libitum, but it is believed that the foundation is laid as broadly and as deeply as it can be in the present condition of the world's knowledge. What future discoveries may bring forth no one may venture to prophesy.

It is believed that these objects come within Sir John Collier's definition. They were something to please the eye of the man who made them, and for this reason, and apparently only this, he made most of them. What should have pleased him is (still quoting Sir John Collier) "what each person must decide for himself," and this man of the Paleolithic period appears to have decided that question in favor of these objects, and in accordance with that canon of his art he made the objects herein to be set forth.

Other aspects of art have been studied and written about by artists and historians from time immemorial. Their consideration opens a field for discussion into which we may not enter. We must content ourselves with this, which appears to be the very beginning of art.

The craving for decorative art and the desire for things beautiful are the common heritage of mankind. Former writers have speculated upon the origin of this craving and have believed it to be contemporaneous with the origin of art, and that they have declared to be as impossible of discovery as the origin of the attraction of gravitation. In this they have deceived themselves and have overstated the case, for it is respectfully submitted that in the following chapters the author has shown the beginnings of art, its earliest specimens, and by related specimens from the earliest people and their descendants confined to a single locality, given a comprehensive exhibition of the objects made, and the styles employed for their decoration; and this carries us back practically to the origin of art. No art objects earlier than these described here are known to have existed in any part of the world.

Professor Haddon¹ speaks of the needs of man which have constrained him to an artistic effort, and which he groups under the four terms of art, information, wealth, and religion. *Æsthetic art* he defines to be the study or practice of art for art's sake, the pleasure of form, line, and color. Omitting color, it is believed that the illustrations of prehistoric art shown in this paper come fairly within this definition. The objects figured and described show art work done for art's sake, to the end that the maker may obtain sensuous pleasure from form and line. Not only is it this, but it appears to be nothing else. All other terms of the group may be omitted so far as concerns the art work of this epoch. Man did not do this work for the sake of

¹ *Evolution of Art*, p. 4.

religion for, so far as can be understood, he had no religion, nor did he make these things for the sake of power or wealth. It does not appear that he considered himself in any way better off by having these objects decorated than he would if they had been plain. There are many hundreds of them which are entirely plain, of equal value for service, evidently utilitarian, without ornament or decoration, and apparently serving as weapons of the chase or war equally well with those highly decorated. Therefore these objects, beautifully designed as they may have been, were no addition to his wealth or his power, and as for information he was not busying himself about that. He gained information, it is true, by experience and his own effort, as he and every other human being did and will, but this wrought his own education and was not for the purpose of educating those around him. So this branch of the story ends where it began; he made these things because they were pleasing to him, and he (each man) decided for himself what was pleasing. These works of art were the material expression of the delight of their maker. The man of the Paleolithic period, savage though he was, had his ideal. The existence of these art works, the representation of the animals which he saw, of the plants and flowers which he must have recognized as beautiful, the existence of these in the caverns which he inhabited, and part of the possessions fabricated by him; their mere existence proves the fact of his ideality, proves that he had a taste and a desire, and are evidence of his gratification thereof. What other ideals he may have had we do not know; he has left no manifestation thereof. So far as we know man his tastes are continually changing, but whether the man of the Paleolithic period changed his tastes or not is not now determinable except so far as shown by his works, first of flint and then of bone, and finally of engraving and sculpture. It is only by these that we may know what were his tastes and what their changes.

Man does whatever art work he desires. The outcome of his work is an expression of his ideal of beauty, of happiness, of goodness, of justice, and what not. When his taste or desire changes, his ideal changes, and with it his work. Everything that man does is done because he wants it to be done; it is his ideal. Human life is only a succession of ideals. The fashion in dress of the present day, why does it change? Why is the ideal of one season discarded the next? A change of taste is the only explanation. What produces this change? "Aye, there's the rub." Taste may be produced and may be changed by study and contemplation. Man is an imitative creature; he is gregarious; he loves to herd with his kind, to follow a leader, to be relieved from the necessity of study or contemplation of the needs of his life; he prefers to follow in the footsteps of his forefathers and the rut or route of civilization and culture which they have marked out for him. It is only occasionally, once in a generation, that some one being with a more energetic or ambitious desire or a greater

harmonizing power, greater analysis, higher judgment, better intellect, becomes a leader of those about him and out of his judgment or through his study or experience he discovers or develops new ideals and so changes the standards of taste and beauty for his generation. But there seems to have been practically no change of the ideals of the Paleolithic man in the center of France. So the flint chipping and bone polishing, while they might have been steps of evolution in man's progress, at last ended in the art objects presented in the first chapters.

The discussion of these abstruse, unknown, psychological questions is not here attempted, though the facts presented are pregnant with suggestions, which can not be here considered, as to the causes which impelled the wild hairy savage of Paleolithic times to produce these art works. We ask ourselves which of his tastes were gratified, which of his longings after the beautiful were satisfied, what folds of the brain or what parts of his nervous system were set into harmonious action, and why and how did the making of these designs produce pleasure in him as he made them, or how did they gratify him when he possessed them?

An examination of these questions would be aside from the author's intention and beyond his powers. He has no desire to enter into a philosophic, metaphysic, or psychologic discussion as to the origin of the art instinct in man or its evolution in his mind. This paper is a contribution to the history of art rather than to the science of art, and is intended as a record of the actual manifestations of art in the various epochs of human culture in prehistoric times, showing the earliest specimens, and thus presenting the idea indicated by the title "*Prehistoric Art, or the Origin of Art as Manifested in the Works of Prehistoric Man.*"

The term "prehistoric" is used in this paper in the ordinary and usual sense, as being prior to history, before the beginning of history, meaning of course human history. As history can be only in writing, this means before written history. Prehistoric science does not depend on historical records made contemporaneous with the happening of the events recorded; it is based upon the evidence of the objects themselves. The discovery of these objects and the birth of the science of prehistoric anthropology lie within the present century. Prehistoric anthropologists have investigated these objects and the various deposits containing them as to (1) their human origin, (2) the geologic age of the stratum in which they are found, (3) their original deposit in that stratum at the time it was formed (that is to say, an absence of intrusion or disturbance), (4) the association and superposition of the implements and objects in the stratified deposits; and by the knowledge and experience thus obtained they have determined that man made these objects and, therefore, he existed in these localities in times of high antiquity.

This paper deals with the art of making and decorating these objects.

Not infrequently theories are advanced as to certain natural artistic manifestations of the human mind. Objections are made to arguments of contact between peoples arising from similarities of objects of art, industry, or decoration.

Mr. A. R. Wallace, speaking of the supposed migrations of the Swastika, says the cross made with two sticks, laid at right angles, would be the easiest, the most natural, and therefore the most likely sign to have been made first by primitive man.

We hear of the cosmic circle, the solar circle, the magic square, etc., as the "foundations of our original conception of the infinite." The sacred wheel of the law is spoken of as "common to all ancient cosmogonies invented for the world and all time. * * * The Aenead of spiritual principles, with their eternal relationships definitely determined by the sacred wheel, have been the inspiration," etc.

The attention of these and similar theorists is called to the fact that we have traced these art manifestations through three great epochs of prehistoric culture; that we have seen styles and designs of decoration without number, and we have to remark the absence of the cross, the circle, and the wheel. The Swastika made its appearance during the bronze age. It seems to have been the earliest known symbol¹ and was probably related to the cross, but except this, though the styles of decoration were principally geometric and made of dots and lines, the fundamental geometric forms of cross, circle, and wheel are not found.

I. PALEOLITHIC PERIOD.

FLINT CHIPPING.²

The earliest manifestations of human art consisted of the chipping of implements of flint, practically the first known to have been made or used by man. They belong to the Paleolithic period of the Stone Age.

¹ Wilson, *The Swastika*, Rept. U. S. Nat. Mus., 1894, pp. 757-1011.

²This is sometimes called "flaking," and perhaps with equal right. My preference is for the term "chipping," if for no other reason than because it is in more common and greater use. A distinction can be made between the two terms, between the objects which are obtained and the processes by which it is accomplished, though usually no such distinction is made. Webster in his definition of—

"Flake, *n.*," speaks of "(1) small collection of snow, (2) a platform of hurdles, (3) a layer or stratum," but nothing relating to the present question.

"Flake, *v. t.*, to form into flakes.

"Flake, *v. i.*, to break or separate into layers, to peel or scale off." We more usually say "to *flake off*."

The Standard Dictionary gives—

"Flake, *n.* 1. A small flat fragment or loosely cohering mass; a thin piece or chip of anything; scale; fleck."

According to Webster, the words "flake" or "flaking" have no reference either to the thing or process involved in this discussion. He says:

"Chip, *n.* (1) A piece of wood or other substance separated from a body by a cutting instrument, particularly by an axe. It is used also for a piece of stone sepa-

This period has been divided according to progress in human culture, and divers names have been given thereto, following the taste of the writers or discoverers. M. Lartet named the epochs after the animals associated with the implements and called them, respectively, the epochs of the Cave Bear, the Mammoth, and the Reindeer. M. Dupont, of Belgium, divided it into only two, and named the epochs after the Mammoth and the Reindeer. M. de Mortillet has divided it into five epochs, and has named them, respectively, the Chelléen, after the station of Chelles, a few miles east of Paris; the Acheuléen, after St. Acheul on the river Somme; the Mousterien, after the caverns of Moustier on the river Vézère, Dordogne; the Solutréen, after the rock shelter of Solutré near Macon; and the Madelainien, after the rock shelter of La Madelaine, Dordogne.

In later days the tendency seems to be to divide them otherwise. M. Cartailhac and M. Reinach, following Sir John Evans, are in favor of the first period being called the alluvium, and the second the cavern. All authorities are, however, unanimous in their agreement that this period and all these epochs, whatever they are to be called, belong to the Quaternary geologic period; that they were earlier than the

rated by a chisel or other instrument in hewing. (2) A fragment or piece broken off; a small piece.

"Chip, *v. t.* To cut into small pieces or chips, to diminish by cutting away a little at a time, or in small pieces.

"Chip, *v. i.* To break or fly off in small pieces."

The Standard Dictionary says:

"Chip, *n.* 1. A small piece cut or broken off. (1) A small thin or flattish piece of wood or stone cut or chopped out. (2) A small fragment with at least one feather-edge, broken off from any hard or brittle body; spall."

According to the author's opinion, the definitions and differences are as follows:

A flake is that object which, of flint, is struck always by a blow, from a core or nucleus in large and usually long and thin pieces. The process by which this is made may be called "flaking." It is, or ought to be, confined to the single blow by which the flake is stricken off.

Chipping comprises all other methods of striking off pieces of flint. It may be used for preparing the nucleus, or for transforming the flake or other material or object into the implement desired.

The fine handiwork done on many, and, indeed, most, of the flint implements described in this paper, has been done by chipping and can not be regarded in any proper sense as that of flaking. The infinitesimal chips by which the deep notches, the fine points, the serrated edges, of spear and arrow-heads, by which the herring-bone handles of Scandinavian daggers and the broad and thin leaf-shaped implements are and have been made, and indeed by which all finely finished and delicately worked flint implements have been brought to their present condition, can not, with any degree of propriety, be called flaking, but should be called chipping. The pieces stricken from these objects by the processes to which they have been submitted can not, without violence to the sense, be called flakes. It appears to the author much more proper to call them chips.

He is well aware that the implement of beaver's tooth used by the Eskimo has been called "the flaker," but this was only the determination or name given by its discoverer and has no other value than that of his opinion. The pieces pressed off with this implement are chips, and not flakes.

present geologic period, and that they came to an end before its beginning. The most certain, and therefore the most satisfactory, division has been that of M. de Mortillet, named after the various localities where the respective implements have been found in their greatest purity. I give my preference to it, subject to the correction incident to further discovery, if for no other reason, because it is more convenient. The names given are for localities, and consequently are purely arbitrary. They may not, perhaps, serve for general terms over the world, but within their own locality they have a definite and certain meaning; while to say the epoch of alluvium, the epoch of caverns, the epoch of the drift, or of the mammoth, bear, reindeer, etc., might have an application in other countries which would deceive the reader. The names Chelléen, Mousterien, etc., have no such application, and can not be applied to other countries. They indicate and describe only one kind of implement and one stage of culture, and, as definitions, they are exact. If other countries have other things to be described, if different epochs are found, then other names may have to be given; but when we speak now of these epochs, the Chelléen, Mousterien, etc., and the implements that belong to them, the speaker and hearer are on a common ground, and both use the terms in the same sense.

These epochs seem to have brought forth the earliest examples of æsthetic art. The man of this time has passed for a savage, and he doubtless was one. He had no tribal organizations, no sociology, no belief in a future state, no religion; he did not bury his dead, he erected no monuments, he built no houses; he was a hunter and fisher, he had no local habitation, dwelt in no villages except such as could be so called from a number of people living in a cavern for the purpose of shelter. Yet he occupied, in the Solutréen epoch, the highest rank as a flint chipper, and in the Madelainien epoch the highest place as an engraver on bone and ivory. His materials were the bones, horns, and tusks of the animals he killed. His tools or implements were sharply worked points or gravers of flint. Most of the specimens of art work are found in caves which had been his habitations. No one has sufficient knowledge to justify the declaration that all specimens of this art work belong to western Europe, but certain it is that most of the known specimens have been from that country. They are found chiefly in the caverns of central and southern France, and while about 400 specimens have been found and preserved, no one knows how many have been missed or remain undiscovered. The specimens found in caverns were originally thrown aside and lost in the débris, and have been protected by stalagmitic or other processes of induration. In making these excavations there is nothing to guide the searcher to the places where these are likely to be found. He must depend on his experience or good fortune. The specimens are usually enveloped in blocks or slabs, which by infiltration and induration became hardened, and must be quarried almost like stone. In bringing these blocks or

slabs to the surface or light many specimens are necessarily broken and lost and many others in the interior of the block or slab are never discovered. It is, of course, not known what number are lost in this or, indeed, in any way, but the specimens being scattered throughout the mass with nothing to indicate their whereabouts, it would be strange if such was not the case. Specimens of these slabs or layers can be shown which would not only explain but demonstrate the truth of these assertions.

Plate 1 is a representation of a portion of the indurated floor of the cavern of Les Eyzies, and is taken from a specimen in the United States National Museum (Cat. No. 9106).

A few specimens of the art work of the Paleolithic period are purely decorative and without attempt to make representation of anything, but for the most part the objects were the animals of the period and locality. Many animals now extinct were represented, and in this way knowledge of their appearance has been preserved. The animals most frequently engraved were the mammoth, cave bear, Irish elk, musk reindeer, chamois, mountain goat, urus or aurochs, horse, deer, and similar animals, and finally man. The marine animals were also represented—the seal, sea lion, tortoise, turtle, fishes, and serpents. Some of the objects thus treated were purely ornamental, while others were utilitarian; *bâtons de commandement*, poniard or dagger handles, and similar specimens were for utility, while other specimens were apparently intended as playthings. Many of them are so broken as to afford no clue to their purpose. This was the art of the Paleolithic period. That of the succeeding periods, the Neolithic and Bronze ages, was of a different style. It was almost entirely decorative and was etched or cut on pottery and bronze objects of utility. During this period there was only the slightest attempt on the part of the artists to represent living or material objects. The decorative art of the period consisted mostly of designs in geometric forms, as squares, circles, lozenges, chevrons, herringbones, zigzags, and crosshatch. Dr. Schliemann thought he found, upon some of the objects found in the Third City of Troy, representations of burning altars and occasional rude representations of animals like the hare. The Swastika seems to have been used throughout the latter period, and is believed to have been a symbol representing good luck, good fortune, long life, much happiness, etc., and to have been the first and earliest symbol in use among men.

These periods (Neolithic and Bronze) brought an entire change in the culture of man as well as in his art. He became sedentary, having a local habitation and place of residence. He became an agriculturist as well as a hunter and fisher; had a religion—at least he buried his dead as though in recognition of a future state. He built houses, constructed forts and fortresses; he built tumuli, mounds, and dolmens, and erected great stone obelisks, sometimes in groups and lines, which,



PORTION OF THE FLOOR OF THE PREHISTORIC CAVERN OF LES EYZIES, FRANCE.

Cat. No. 9106, U.S.N.M. Size, 12 inches.

for want of a better name, are called alignments. He acquired the art of and became an adept in chipping, grinding, polishing, and drilling stone, especially the hard flint and tough jade, of which he left some magnificently wrought specimens. A few whistles have been found belonging to the Paleolithic period, but the greater proportion of them belong to the Neolithic period and Bronze age. The American Indian and his congeners, those on the West Indian Islands or Antilles, were in the Neolithic stage of culture and their decorative art was practically the same as of that age in Europe. They excelled their European brethren, however, in making rude drawings and pictures, principally petroglyphs, many of them, doubtless, ideographs, telling a story by their description. They often reproduce the human figure, which the European rarely did. The aborigines of Mexico, Central, and the north-western part of South America, although still in the Stone age, reached a higher civilization, mainly manifested by their fine sculpturing of stone, the erection of extensive and magnificent temples, and their ideographic language.

No theory will be propounded in this paper, the only intention being to present facts on which arguments can be made and theories built. The sociology of the prehistoric man will not be essayed, and no *a priori* arguments will be introduced to explain the psychology of prehistoric man, nor will any philosophic treatise be attempted, giving pretended explanations of the causes which impelled aboriginal man to indulge in essays at æsthetic art other than the requirements of his condition or the suggestion of his fancy. To do this would be to substitute theory for fact.

The present paper will be devoted to Prehistoric art, and will not deal with Prehistoric anthropology. That subject is left to other works, a list of the principal of which is given in the author's Handbook,¹ published in the Report of the United States National Museum of 1887-88.

The Paleolithic period, the earliest epoch of the Stone age, obtained its highest known development in western Europe, possibly because it has been more profoundly studied there than elsewhere. By common consent it has there been subdivided into epochs according to the degrees of art manifested. Different names have been given to these epochs, and while there has been some dispute about details, the main proposition of a Paleolithic period earlier than the Neolithic has been accepted by all.

The peculiar characteristic of the implements of the Paleolithic period is that man's cutting implements, usually of stone, preferably flint, were always made by chipping. In the later epochs of the Paleolithic period certain implements were made of bone and horn, which were ground or smoothed, while those of stone were not. It is not, however, to be supposed that every chipped stone implement belonged to the

¹A Study of Prehistoric Anthropology, p. 597.

Paleolithic period, for the prehistoric man of the Neolithic period chipped many implements of stone. All implements of flint, whether Paleolithic or Neolithic, were made partly or wholly by chipping. Arrow and spear heads, knives, scrapers, drills, perforators, and such, of whatever age, period, or epoch, when of flint, were made wholly by chipping, while many implements of stone made by grinding or polishing were first prepared by chipping or hammering. It is, therefore, proper that a paper on Prehistoric art should begin with flint chipping.

CHELLÉEN EPOCH (ALLUVIUM).

The beginning of flint chipping is found in the flint implements of the Chelléen epoch, called by some persons in Europe the Alluvial, by others the Cave Bear period.

M. de Mortillet, in his subdivision of the Paleolithic period, names this the Chelléen epoch after the station of Chelles (Plate 2), in the valley of the River Marne, a few miles east of Paris. This station was

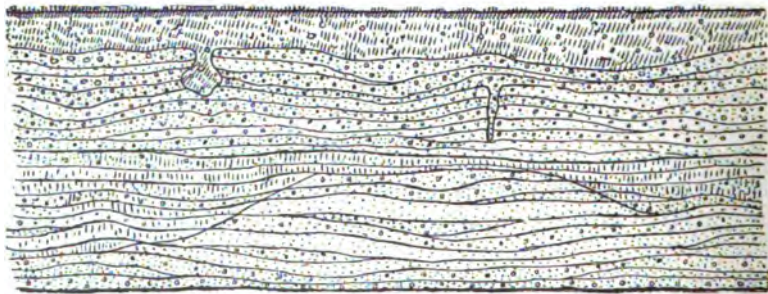


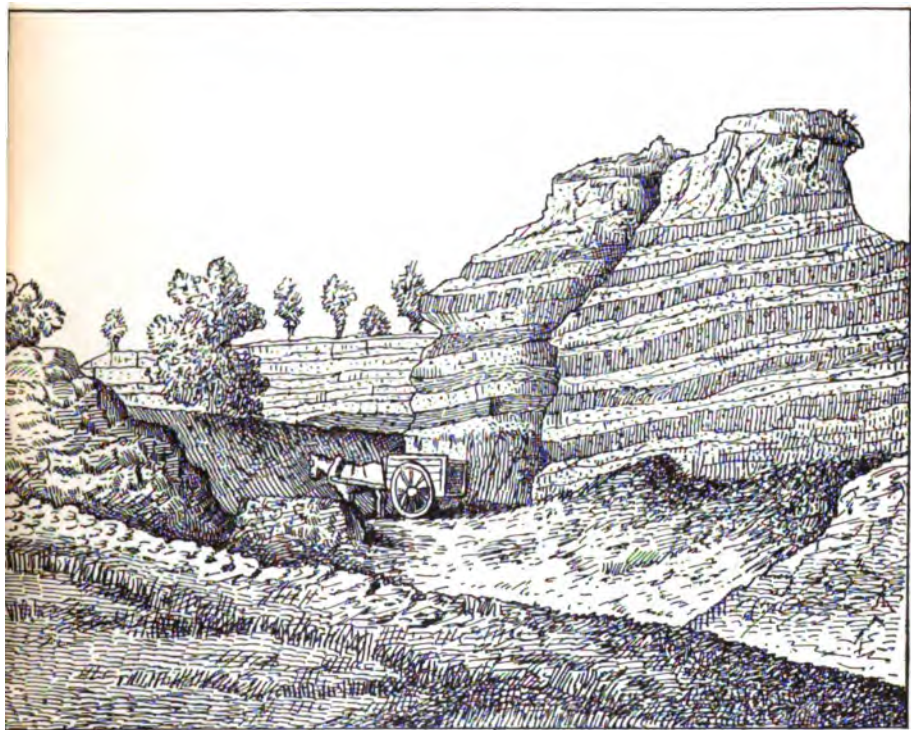
Fig. 1.

QUATERNARY GRAVELLY DEPOSIT AT CHELLES, SECTION WHEREIN PALEOLITHIC IMPLEMENTS ARE FOUND.

Cleuziou, *Creation de l'Homme et les Premiers Ages de l'Humanité*, p. 172, fig. 98.

chosen as representative because the implements were there found in their greatest purity, though not in their greatest number. These have in England been called drift implements because they have been found principally in the river drifts or deposits. Their original position indicates the same antiquity as the gravel deposits themselves.

There was a time when the water of the rivers filled the valleys from hill to hill, pouring down with a rush its irresistible current, eroding the earth, and, if need be, the rock, to make for itself an outlet. As time progressed the water subsided and the current became less powerful. The sand and gravel which had before been carried out to the sea began to be deposited in this bend and on that point, until at last the deposit came to the surface of the water, and formed what is now the highest terrace. This narrowed the river and the terrace became a new river bank. This process was repeated again and again, until the river finally retreated to its present bed and left its terraces, sometimes



PREHISTORIC STATION OF CHELLES SHOWING ALLUVIAL DEPOSITS, IN THE VALLEY OF THE RIVER MARNE, 19 KILOMETERS EAST OF PARIS.

Cleuziou, *Creation de l'Homme*, p. 178, fig. 101.

three in number, the first being higher, deeper, and more distant from the river than the others. These are now marks of the successive stages in the formation of the river valleys.

The gravelly deposit of the River Marne at Chelles forms the plain of the river valley. It is from 22 to 26 feet in thickness (Plate 2). The sand and gravel rests upon the original chalk and is about on a level with the highest floods of the river in modern times. These deposits are of different degrees of fineness and are laid in strata or layers, showing that they were made by the action of the water (fig. 1). The strata are not always continuous, and they differ in thickness and position, showing the water to have had varying currents. Large, erratic bowlders are found occasionally. The sand and gravel are sometimes intercalated with other strata, which show a change in the surrounding conditions. The most frequent of these is an irregular stratum of calcareous cement. In other places are pockets or strata containing various solutions of iron, the percolating water from which gives the color to the implements described, and sometimes forms the cement itself.

There has been much discussion over the time and manner of the formation of these river valleys and the deposit of their sand and gravel as bearing on their antiquity. Such a discussion is unnecessary here, but all disputants are agreed that implements of human industry are found in these river gravels in positions which indicate their deposit at the time of the original formation and at a distance from the river and depth below the surface which indicate their antiquity to be equal with the earliest deposits. Whether they were swept down from the springs which formed the head waters of the river, were dropped on the borders of the stream in the near neighborhood, or precisely in what manner they became involved with the sand and gravel in which they are now found, is not only unknown but there has not yet been any entirely satisfactory theory developed.

A series of these implements is presented, side and edge views, so that the student may understand the differences between these and the thinner leaf-shaped implements and spearheads of other periods and epochs, with which they are not to be confounded. These differences are vital, and as they can not be brought out by a side view alone, an edge view is deemed sometimes indispensable. Some of the implements from Chelles are extremely crude and rough and belong to a very primitive industry, yet they may not be omitted from a work on Prehistoric art.

The Chelléen implements figured represent the standards for this epoch. They are mostly oval, with a cutting edge at the point, contrary to those of the Neolithic period. The body of the implement is thick, after the shape of an almond or peach stone, and not thin and flat, as a laurel leaf, like those of a later epoch. They were of flint where that stone was obtainable; where it was not, quartz and quartzite seem to have been employed. The flint always broke under a blow

with a conchoidal fracture, and this may frequently be seen. Some specimens were made from boulders, and in chipping to a cutting edge

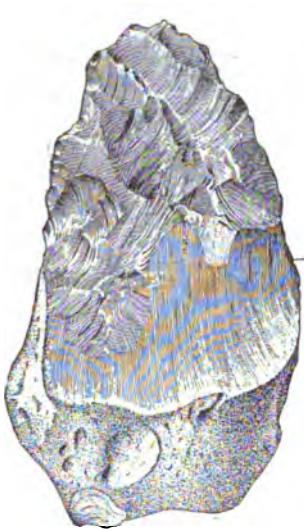


Fig. 2.

PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.

From the River Arve, at the prehistoric station of Thennes, France.

Cat. No. 99440, U.S.N.M. $\frac{1}{2}$ natural size.

or point the crust of the pebble was often left as a grip. Fig. 2 (Cat. No. 99440, U.S.N.M.) is one of these. It comes from the station of Thennes, in the river Arve, an affluent of the Somme, France. It has been finely chipped to a sharp cutting edge around one end. Fig. 3 (Cat. No. 11083, U.S.N.M.) represents one of the same type from Thetford, England. It shows the chalky crust for a grip, while the other end is chipped to a point, as though for digging rather than cutting. These pebbles both belong to the chalk formation, as do most of the flints from these countries. Fig. 4 (Cat. No. 35121, U.S.N.M.) represents a standard type of these

implements from the valley of the Loire, central France. It is oval or almond-shaped, with the cutting edge at the point, but has been made of flint from a ledge, and not from a nodule or pebble. The entire surface, both sides and edges, has been worked by chipping, though the butt or grip is thicker and has its edges battered so that it can be better held in the hand. The hand may also have been protected against the sharp edges or corners by a bit of skin, fur, grass, or similar substance. It is doubted whether any of these implements were attached to a handle. It required great care and labor for the Paleolithic workmen to chip them to this sharp edge all around, and when so done it produced an implement the form of which was the most difficult to successfully insert in a handle. To make a firm attachment of an implement of this form, the handle must



Fig. 3.

PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.

Gravels of the Little Ouse, Norfolk, England.

Cat. No. 11083, U.S.N.M. $\frac{1}{2}$ natural size.

envelop it at its greatest diameter, and herein lies the first difficulty. If the sharpened implement be insufficiently inserted it will drop out; if only partially inserted a few hard blows would split the handle; if it be inserted too far the same blow will drive it through.

The particular or special use of the Chelléen implement is unknown, though it may easily be surmised. The wise men of Europe have made many guesses and suppositions, but beyond the suggestion of a cutting or digging implement adapting itself to varying daily needs of the aboriginal man, all these are naught but speculation. Many of the implements bear undoubted traces of use on their cutting edges. Sir John Evans, in his latest work, reverts to his first and original opinion, that "it is nearly useless to speculate as to the purposes to which they were applied." Sir John Lubbock says:

Almost as well might we ask to what would they not be applied. Infinite as are our instruments, who would attempt, even at present, to say what was the use of a knife? But the primitive savage had no such choice of tools. We see before us, perhaps, the whole contents of his workshop, and with these weapons, rude as they seem to us, he may have cut down trees, scooped them out into canoes, grubbed up roots, killed animals and enemies, cut up his food, made holes in winter through the ice, prepared firewood, etc.

Attention is called to the relation of width to thickness of the specimens shown, especially in fig. 4, because this is a characteristic of Paleolithic types, and one of the recognizable differences between Chelléen and all other implements. This specimen is $3\frac{5}{8}$ inches in width and $1\frac{1}{4}$ inches in thickness—or the thickness is 53 per cent of the width. The average Solutrean and Neolithic leaf-shaped implements of this width are about three-fourths of an inch, or 22 per cent of the width.

The flint of which these implements are made has, in many specimens, passed, since their manufacture, through certain chemical and physical changes on the surface. Some show a certain brilliancy, in some the color has changed to red or yellow, and so on through the scale to chalky white. This change, called patina, is produced by contact with

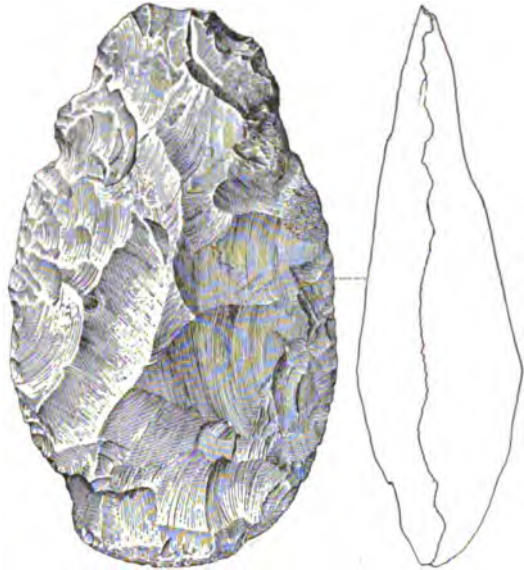


Fig. 4.

PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.

Loire Valley, central France.

Cat. No. 35121, U.S.N.M. $\frac{1}{4}$ natural size.

the atmosphere or the earth, or with the water which has percolated through the earths in the neighborhood, generally those containing iron, and these have changed the chemical combination of the flint on its surface. This change sometimes extends deep into the stone, and in small specimens under favorable conditions may pass entirely through it.¹ In the United States all this might be called weathering; in France it is called patine. The objection to the former word is that it conveys, possibly involuntarily, some relation to the weather, while the patine may be formed on specimens deep in the earth. Dendrites

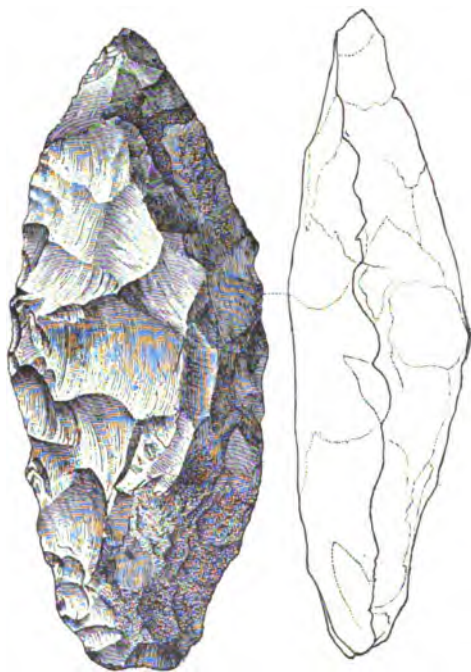


Fig. 5.

PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED FLINT.

From the (surface) forest of Othe, eastern central France.

Cat. No. 99457, U.S.N.M. $\frac{1}{2}$ natural size.

are also formed on the specimens. These changes are evidences of antiquity of the specimens, and to the experienced eye become testimonials of its genuineness. Fig. 5 (Cat. No. 99457, U.S. N.M.) represents a slightly different form. It is longer, narrower, thicker, and is more pointed. Its length is $6\frac{1}{2}$ inches, width $2\frac{5}{8}$ inches, and thickness $1\frac{1}{8}$ inches, or 71 per cent. It comes from the forest of Othe, department of Aube or Yonne, eastern central France, and is one of the many surface finds of France. It has been strongly objected to similar specimens found in the United States that, being found practically on the surface, they are not evidence of a Paleolithic period; and the force of this objection is admitted. However, many such implements have been found

on the surface of the high plateaus of western Europe, and they have always been considered as true paleoliths. This question is not to be argued here; those interested in it are referred to the handbook² previously cited, where some of the instances are stated and authorities quoted.

It has already been remarked that most of the Paleolithic implements from western Europe are of flint, but all are not so. An exten-

¹ Geo. P. Merrill, *A Treatise on Rocks and Rock-weathering*, U. S. National Museum, New York, 1897.

² Page 611.

sive workshop for the manufacture of Paleolithic implements was found on or near the surface at Bois du Rocher not far from Dinan, France, by MM. Micault and Fornier, of Rennes. The material was quartzite, and chips, flakes, hammer stones, and unfinished implements, with the usual débris, were found, and along with them a number of finished implements, of which fig. 6 (Cat. No. 99541, U.S.N.M.) represents one. It has the same peculiarity of relative thickness as other Paleolithic implements, but is more disk-shaped than any heretofore shown.

Implements corresponding to those of the Chelléen epoch are found practically over the world. This would indicate the expansion of that civilization and the duration of the epoch to have been much greater than has been supposed. Those from Great Britain are

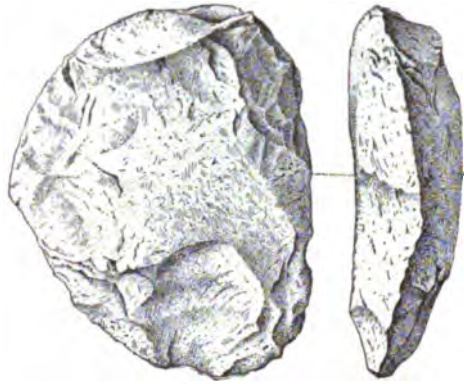


Fig. 6.
PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED QUARTZITE.

Bois Du Rocher, near Dinan, Brittany, France.
Micault and Fornier. Cat. No. 99541, U.S.N.M. $\frac{1}{2}$ natural size.

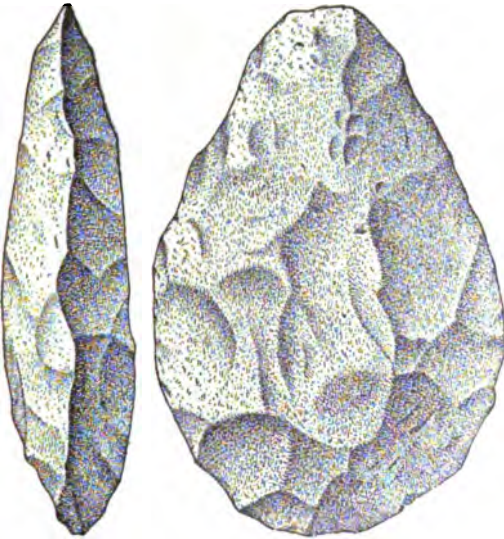


Fig. 7.
PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED QUARTZITE.
Leiria, near Lisbon, Portugal.

Cattailhac, Spain and Portugal, p. 30, figs. 23 and 24. $\frac{1}{2}$ natural size.

found only in the eastern and southern portion from Norfolk around to Devonshire and Lands End. They have been found in every quarter of France and southern Belgium, in all parts of Italy, and in Spain and Portugal (fig. 7). They have not been found in northern England, Scotland, Wales, nor northern Ireland; neither in northern Belgium, nor Holland, nor in the Scandinavian countries, nor that portion of Germany bordering on the Baltic, nor in northern Russia. These countries may have been covered with glaciers at that epoch, or possibly by the great North Sea. Paleolithic implements have been found in Asia, in Palestine, in India from Bombay to Calcutta (fig. 8, Cat. No. 88190, U.S.N.M.),

in Cambodia, in Japan, in Africa (fig. 9, Cat. No. 170677, U.S.N.M.), up the valley of the Nile, and lately in the United States.

ST. ACHEULÉEN EPOCH (ALLUVIUM).

Some of the prehistoric archaeologists of France have sought to make a subdivision of the culture of the Chelléen epoch and to denominate the specimens from St. Acheul near Amiens on the Somme River, France, by the name of that station. These specimens are thinner, with smaller flakes; are finer in their manufacture, and show an improved art of flint chipping. Fig. 10 represents one of these specimens. It is of flint, pointed, almond-shaped, showing part of crust of pebble left for grip, and with cutting edge at the small end.

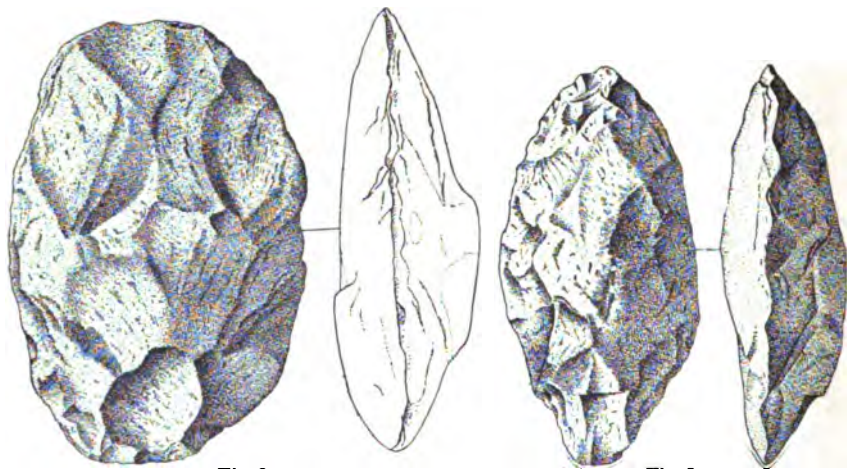


Fig. 8.
PALEOLITHIC CHELLÉEN IMPLEMENT OF CHIPPED
QUARTZITE.

Laterite beds near Madras, India.
Cat. No. 88190, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 9.
PALEOLITHIC CHELLÉEN QUARTZITE IMPLE-
MENT.

Africa.
Cat. No. 170677, U.S.N.M. $\frac{1}{2}$ natural size.

FLINT IMPLEMENTS IN THE UNITED STATES.

Implements in large numbers have been discovered in nearly every State of the United States, bearing great resemblance in form, appearance, and mode of manufacture to the Paleolithic (Chelléen and St. Acheuléen) implements from western Europe and the localities just mentioned. If accepted as such, their presence would prove the occupation of America by a prehistoric race of the same culture status.

The investigation concerning these implements has not been very profound, nor has it been settled to the satisfaction of all prehistoric archaeologists, perhaps not even to a majority, that they are truly Paleolithic implements. There have been various contentions concerning this. On this subject the author has formulated his conclusions as follows:

It is apparent on slight inspection that these implements found in the United States, although mostly on the surface, are of the same Paleolithic type as those found in the gravels of Europe and elsewhere.

No attempt is made to define Paleolithic civilization or culture, nor to describe the man who made or employed these implements. These implements are not declared to be either glacial or preglacial, yet they have been found in glacial gravels, and they are decided to be different from the implement common to the Neolithic civilization of America. Thus they furnish a working hypothesis indicating a stage of Paleolithic culture in America. This conclusion is expressed under all reserve, and subject to future discoveries. As a working hypothesis, it may stimulate investigators to search in such gravels, fluvial or glacial, as may be suspected of containing them.

This might induce investigators and collectors to gather and save them as valuable to science, to note all objects, and to correctly report all possible information concerning them. In Europe, Paleolithic man belonged to a past geologic age called there the Quaternary; the objects of his industry were found associated with the remains of extinct animals usually fossilized, belonging to the aforesaid geologic epoch, and, therefore, if we are to find Paleolithic man in America in times of similar antiquity, we must call to our aid the science of geology. If Paleolithic man occupied America, whether he be the Indian

or his ancestor, the implements will surely be found sometime and somewhere; and then those who are now opposed will agree. If the implements are not found, then those now favoring will be compelled to give it up. In any event, the investigation should be made, and no adverse decision is justifiable while the question is pending.

It is not intended to make here any argument favoring a Paleolithic epoch in America, but only to note the similarity in the early prehistoric times in the art of flint chipping in Europe and other localities with the same art in America. A series of implements from our country is here presented. Figs. 11 and 12 represent specimens from Texas;

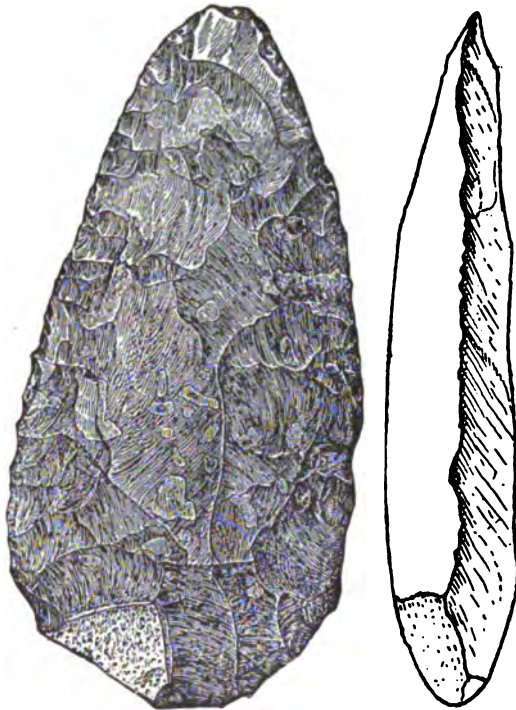


Fig. 10.

PALEOLITHIC ACHEULÉN IMPLEMENT OF CHIPPED FLINT.

Gravels of the River Somme, at St. Acheul, France.

Cat. No. 137535, U.S.N.M. $\frac{1}{2}$ natural size.

13 and 14, those from Wyoming; 15, from Mount Vernon, Virginia. Plates 3 and 4 represent a series from the District of Columbia and Mount Vernon, Virginia, respectively.

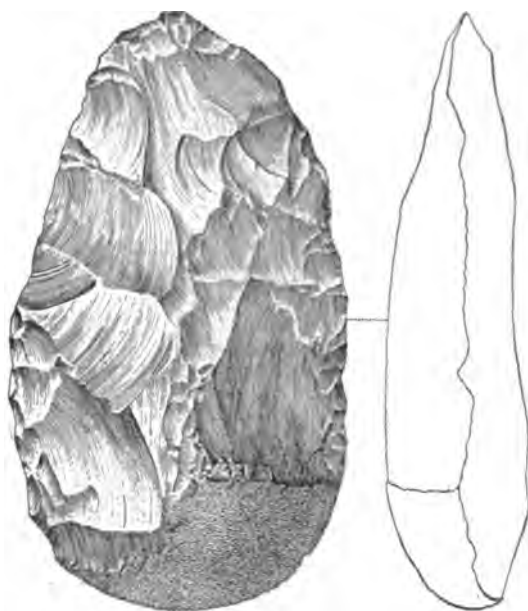


Fig. 11.
RUDE CHIPPED FLINT IMPLEMENT OF PALEOLITHIC TYPE.
Side and edge views.
Texas.

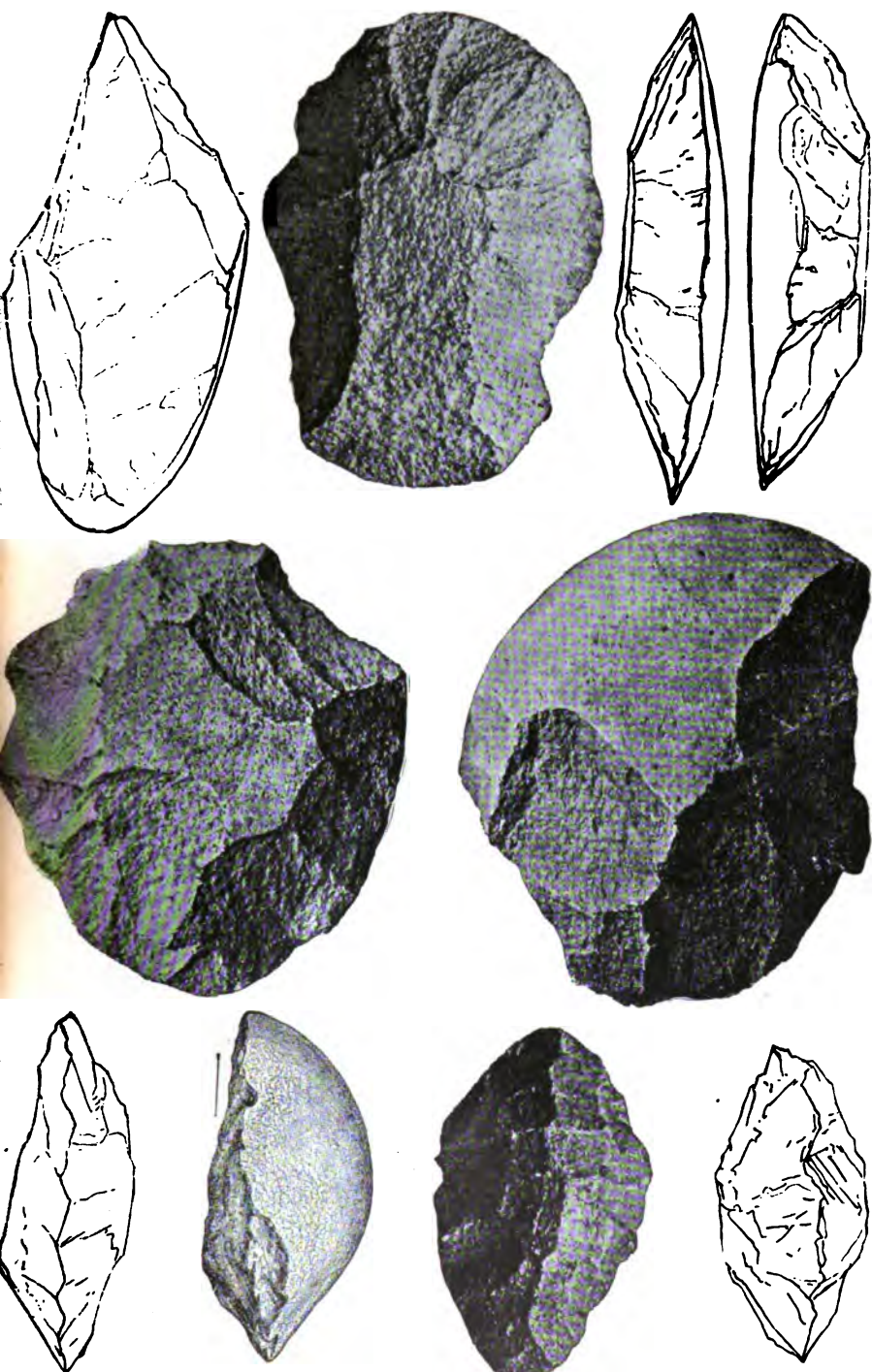
Cat. No. 21152, U.S.N.M. $\frac{1}{2}$ natural size.

It appears certain that there was at the beginning of this epoch a material change in human art and industry. The Chelléen and St. Acheuléen implements, so widespread, were superseded by objects now found in the caves and rock shelters occupied by man. This statement might be doubted if it rested on a few objects, but its truth will be apparent when we consider that these implements have been found throughout western Europe by hundreds of seekers, in thousands of places, and to the number of tens of thousands, but *never associated with cave implements or objects*; while on the other hand, tens of thousands of cavern implements and objects have been found in their appropriate places and never associated with *Chelléen or St. Acheuléen implements*. I say *never*—if any have been thus found, the proportion is insignificant, not one in a hundred, so that the statement is substantially true.



Fig. 12.
RUDE CHIPPED FLINT IMPLEMENT OF PALEOLITHIC TYPE.
Side and edge views.
Texas.

Cat. No. 179789, U.S.N.M. $\frac{1}{2}$ natural size.



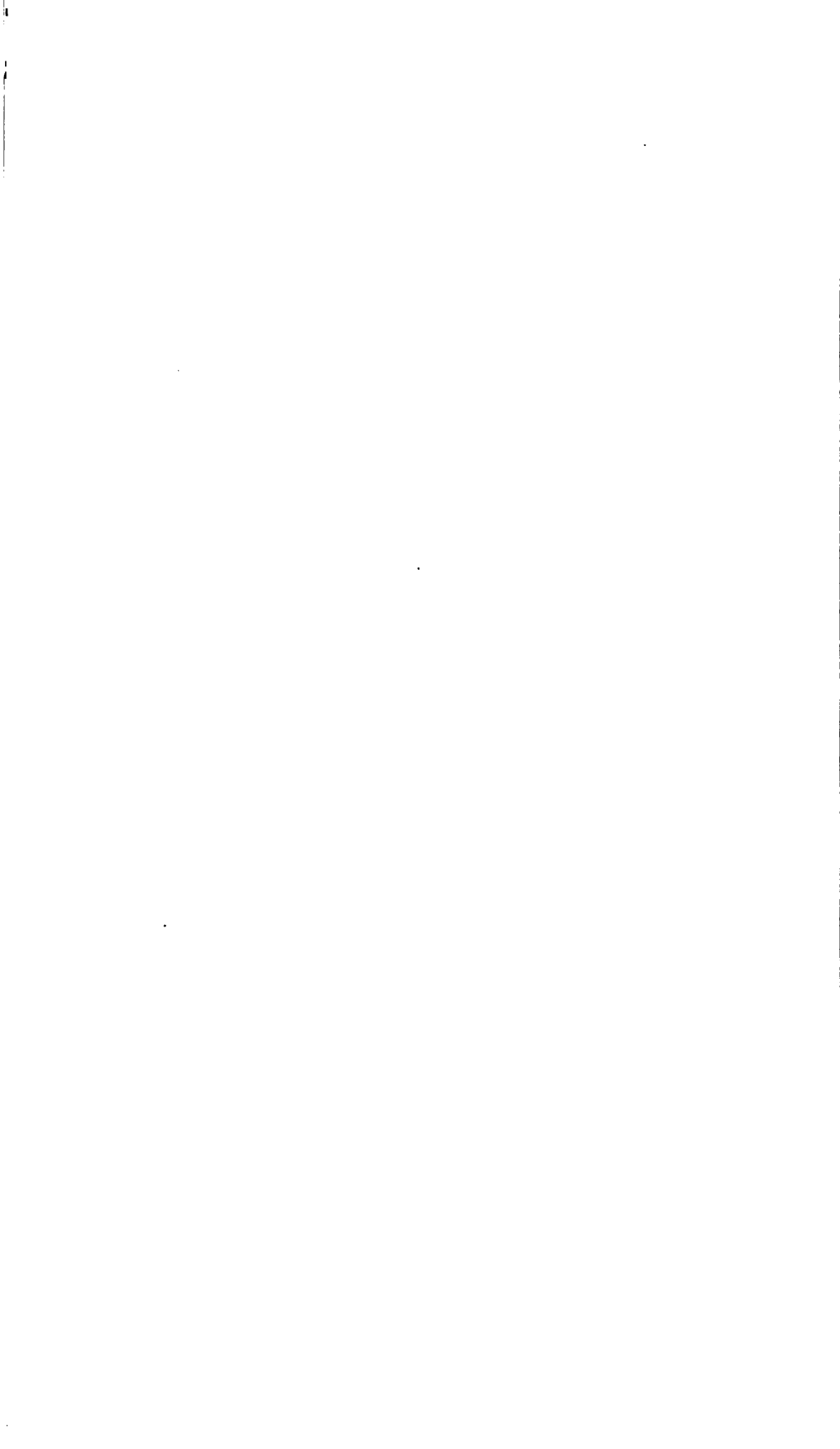
RUDELY CHIPPED QUARTZITE IMPLEMENTS OF PALEOLITHIC TYPE.
District of Columbia.
U. S. National Museum.

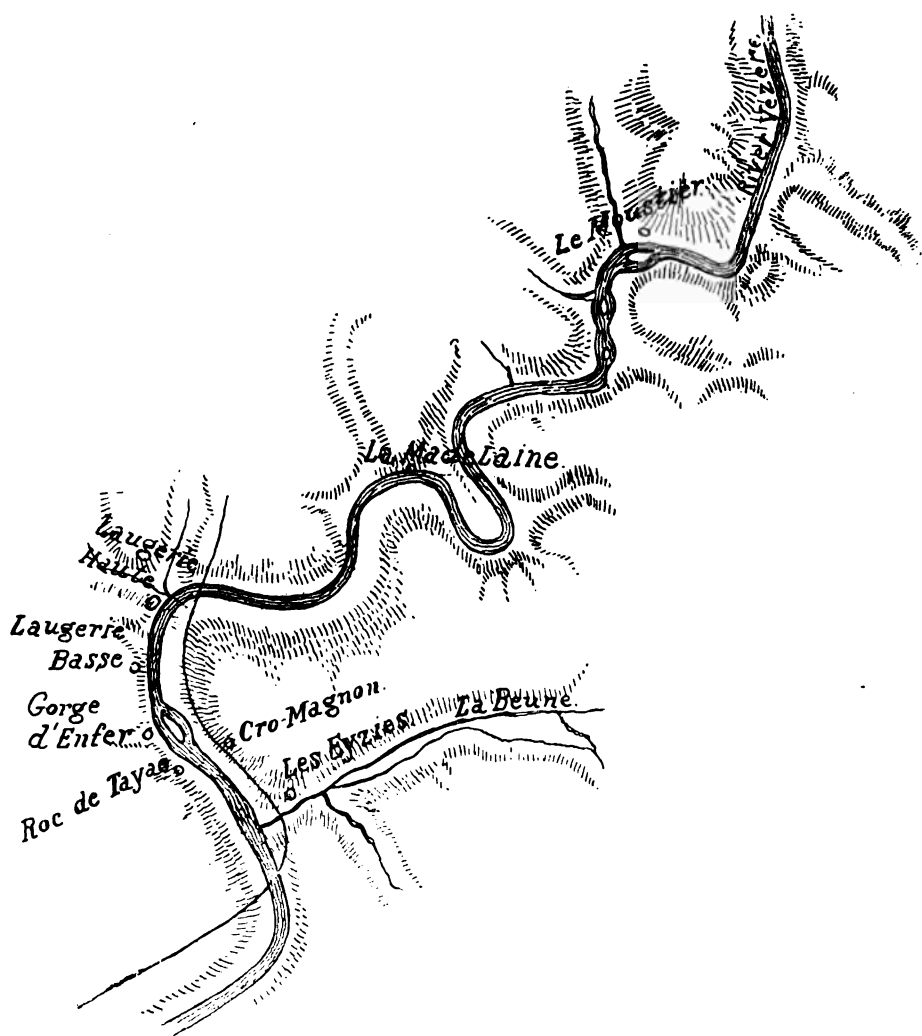


SERIES OF RUDELY CHIPPED QUARTZITE IMPLEMENTS OF PALEOLITHIC TYPE.

Mount Vernon, Virginia.

Cat. Nos. 136952, 150378, U.S.N.M. $\frac{1}{2}$ natural size.





MAP OF THE RIVER VÈZÈRE (DORDOGNE), FRANCE, SHOWING SETTLEMENTS IN THE PALEOLITHIC PERIOD.

Scale, 10000.

Hundreds of caves and rock shelters have been found throughout western Europe bearing evidence of their human occupation during this period. Many of them are located on the River Vézère, Dordogne. Plate 5 represents a map of the River Vézère, from Les Eyzies, where it empties into the Dordogne River, to Le Moustier, 10 kilometers above.

The principal prehistoric caverns in this neighborhood are Le Moustier, La Madeleine, Langerie Haute and Basse, Gorge d'Enfer, Oro-Magnon, and Les Eyzies, but there are others smaller in size and less in importance. M. E. Rivière discovered a new cave during the summer of 1896.

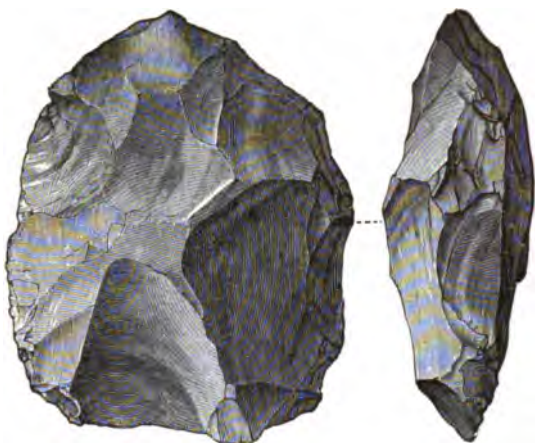


Fig. 13.

RUDE CHIPPED IMPLEMENT OF PALEOLITHIC TYPE OF BLACK FLINT.

Side and edge views.

Wyoming.

Cat. No. 11538, U.S.N.M. $\frac{1}{2}$ natural size.

In the summer of 1884 the author visited this locality and inspected and worked in some of these caverns. The cavern of Le Moustier has been excavated to the bed rock throughout, and all traces of human occupation in prehistoric times removed. The principal objects of

human industry found therein were points and scrapers, with cores, flakes, chips, débris, etc. On the plateau at the top of the cliff some of the smaller and finer specimens of the St. Acheulén type have been found, with chips, cores, and débris. This has been presented as evidence of the relationship between the Chelléen epoch and the Moustérien, which succeeded it. It is remarkable, although alleged to be an undoubted fact, that these two localities, in such juxtaposition, should have furnished

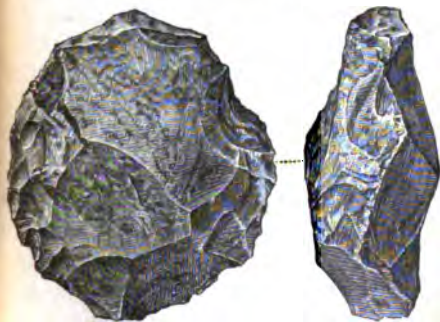


Fig. 14.

RUDE CHIPPED IMPLEMENT OF PALEOLITHIC TYPE, BROWNISH-YELLOW JASPER.

Side and edge views.

Wyoming.

Cat. No. 10543, U.S.N.M. $\frac{1}{2}$ natural size.

implements so different in style, type, mode of manufacture, and use, and have represented stages of culture so different. This has been accounted for on the theory of the intervention of the Glacial

period and that the two stages of culture represent man's adaptation of his art to the changed environment. In the earlier epoch the climate was warm, and man had apparently, or possibly, no need for shelter or clothing, as no traces of either have been found; all his implements were weapons, and suitable for the chase or, if need be, for war. In the later epoch the weapon became a spearhead or harpoon (more likely the latter), while a new implement, the scraper, is introduced, by which he is supposed to have utilized the skin of animals

which he had killed by making them into clothing or coverings. The caverns which were his new habitations furnished him both shelter and warmth.

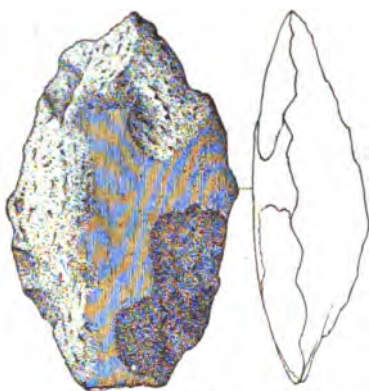


Fig. 15.

RUDE CHIPPED QUARTZITE IMPLEMENT OF PALEOLITHIC TYPE, MADE FROM A PEBBLE.

Side and edge views.

Mount Vernon, Virginia.

Cat. No. 1073 loan, U.S.N.M. $\frac{1}{2}$ natural size.

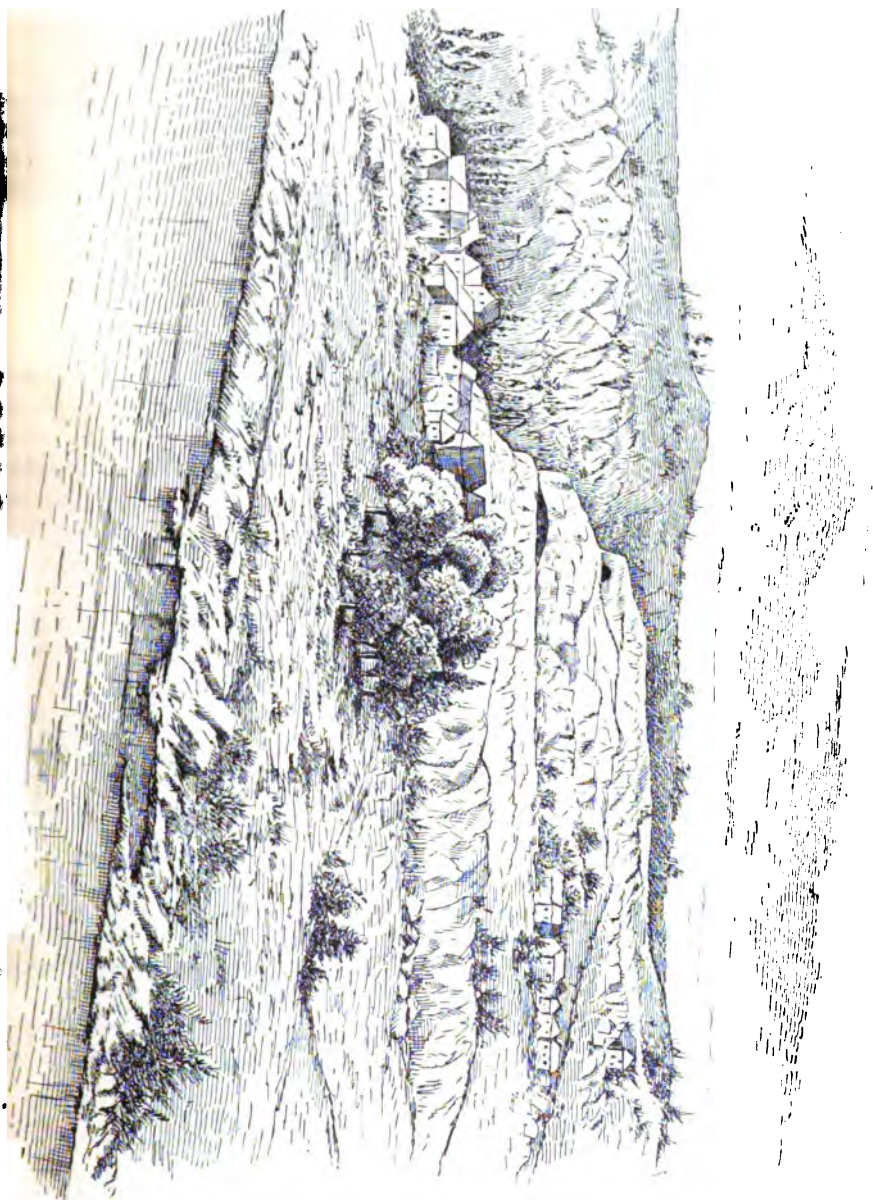
MOUSTERIEN EPOCH (CAVERN PERIOD).

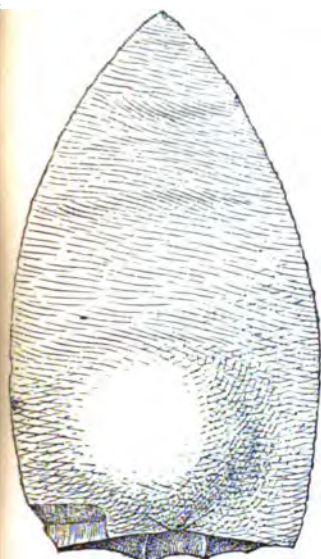
In the subdivision of the Cavern period the earliest epoch has been called Mousterien from the cavern of Le Moustier (Plate 6). The peculiar art of this epoch and that which caused the subdivision are the points (Plate 7) and scrapers (Plate 8) found in such numbers, especially in this cavern. These specimens may not be the highest art, yet they are interesting from

an artistic point of view no less than from an anthropological, for they are the first improvement in flint chipping, the earliest art learned by man. It is a step in the evolution of that art, and will be followed by another step in the next succeeding epoch. These points are the earliest analogous to spearheads, made or used by man, and undoubtedly the ancestor or forerunner of all arrow or spear heads.

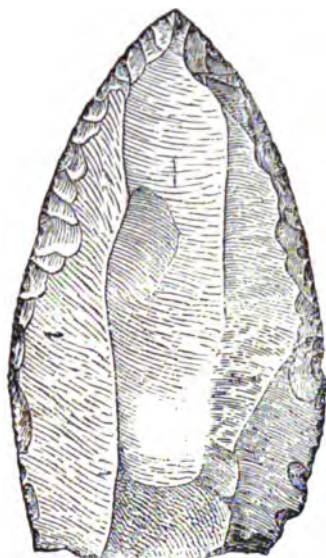
The Mousterien scraper was the earliest implement of its kind made by man. These, as well as the Mousterien points just described, were made usually of flint, and by chipping. These specimens are additionally interesting as the first step taken by man in the art of tanning and as being the oldest specialized tool or utensil known to him.

The flint chipping peculiar to this epoch, shown by these specimens is that one side of both utensils is left smooth as when struck from the nodule or nucleus by the blow that knocked off the flakes (Plates 7 and 8, fig. a). The back has been made shapely by smaller flakes usually three in number, struck off longitudinally (Plates 7 and 8, fig. b). This is the very beginning of this art, and as we see how the operation became improved we will wonder at the adeptness with which it can be performed.





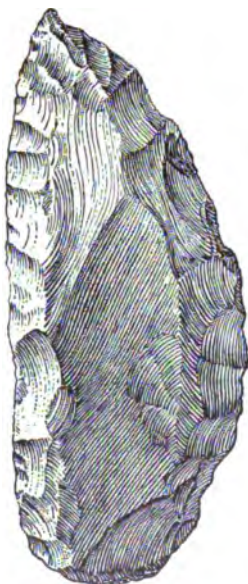
a



b



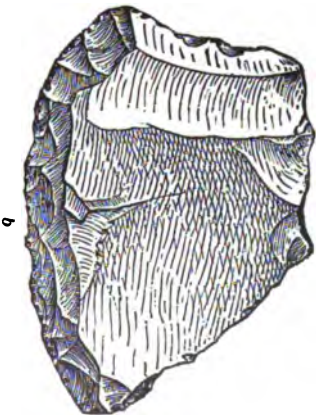
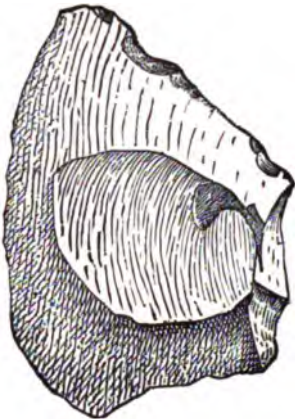
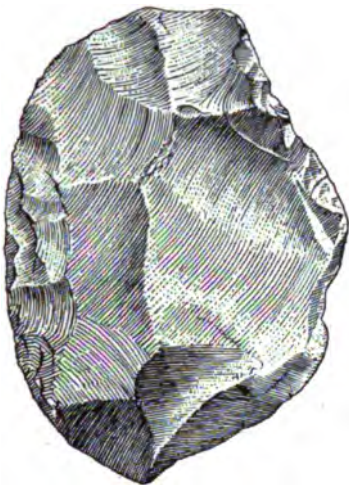
c



d

MOUSTERIEN POINTS (PALEOLITHIC), OBTVERSE AND REVERSE.
Cat. No. 9015, U.S.N.M. Natural size.

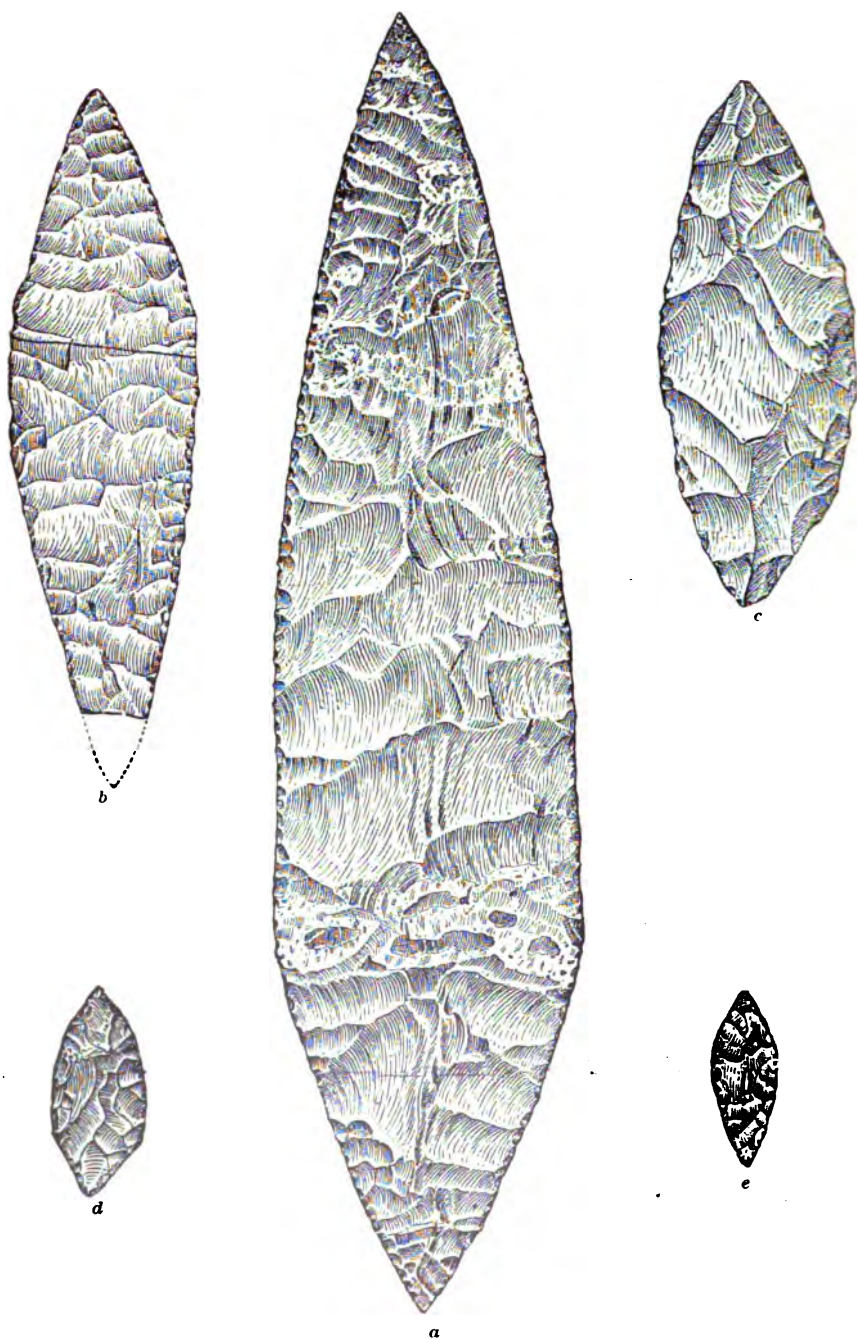




MOUSTERIEN SCRAPERS (PALEOLITHIC), OBLVERSE AND REVERSE.
Cat. No. 98936, U.S.N.M. Natural size.







SERIES OF SOLUTRÉEN (PALEOLITHIC) LEAF-SHAPED BLADES.
Cast, Cat. No. 99747, U.S.N.M. † natural size.





a



b



d



c

NOTCHED OR BARBED SOLUTREEN (PALEOLITHIC) POINTS.

a, rudest form; b, form leaf-shaped; c, finest form, broken; d, finest form, restored.

SOLUTRÉEN EPOCH.

The art of flint chipping has never, in prehistoric times, nor among prehistoric or savage peoples, attained a higher degree of excellence than during the Solutrén epoch. There seems to have been an evolution from the rude and heavy Chellén implement up to the fine Solutrén leaf-shaped blades. What time elapsed between the two we have no means of determining; it is to be counted by geologic epochs and not by years or centuries. There was a regular and steady improvement in the art of flint chipping, produced, apparently, by continued experiment and practice, the result of which must have been communicated or transmitted from father to son, from teacher to student, from master to apprentice, until the ideal flint chipping was attained in the Solutrén leaf-shaped blades (Plate 9). During this epoch the spear-heads of the Mousterien epoch became perfected in form, style, and delicacy of manufacture. They increased in length and decreased in thickness, until the standard implement took the shape of a laurel leaf and the name "leaf-shaped," which name has been perpetuated and extended to similar implements throughout all ages and countries. They will be shown in the chapter on America. The leaf-shaped spear-head was not only enlarged to the largest size, but it was diminished to the smallest, so as to assimilate them with the leaf-shaped arrowheads (Plate 9).

A further development was wrought by changing these implements so as to make a shoulder on one side (Plate 10), and herein it was probably the ancestor or precursor of the notched or shouldered arrow and spear head which traveled throughout both hemispheres while civilization was yet young, and long before history began.

The same kind of development was made in the scrapers, by which the scraping edge was changed from the side to the end (fig. 16), and this round-ended scraper has continued through all prehistoric times and among almost all savages in historic times who have used any such kind of implement. Practically the same utensil has been seen in the hands of untaught savages by men still living. The stone scraper of the Eskimos, used until the advent of the Russian on their shores, was not different in form, appearance, or manufacture, and probably not in use, from that which began in this epoch. The same utensil was prevalent among North American Indians as it was among all savages who used skins for dress or tent covering, and so had need to use the scraper. The *teshoa*, so named by Dr. Leidy, and used by the Indians on the eastern slope of the Rocky Mountains, is the principal, if not the only, exception. This was simply a round or oval spawl struck from a smooth quartzite or other hard boulder, the scraping edge of the spawl making the edge of the tool. The United States National Museum possesses specimens of it. (Cat. Nos. 170602, 170667, and 11540, U.S.N.M.)



Fig. 16.

ROUND-ENDED SOLUTRÉEN (PALEOLITHIC) SCRAPER.

Cat. No. 99812, U.S.N.M.
½ natural size.

ENGRAVING, SCULPTURE, AND PAINTING.

MADELAINIEN EPOCH.

M. Lartet named this the Reindeer epoch because of the great number of remains of this animal found during his explorations in southern France. Plate 11 is a perspective view of the station of La Madelaine.



Fig. 17.

FLINT SCRAPER WITH
ROUNDED END (PA-
LEOLITHIC).

La Madelaine (Dor-
dogne), France.

Lartet and Christy. $\frac{1}{2}$ nat-
ural size.

It is a rock shelter, not being of sufficient depth to be called a cave or cavern. The rock overhangs, as is shown in the plate and as is still better shown in plate 12, of *Laugerie Basse*. The base of the cliff was eroded by the stream and the projection afforded shelter for its human occupant. The author spent some time in this station, and found it, contrary to the condition of the other stations, far from being exhausted. Its owner prohibits further excavation by the public, and requires everything to be done under his own supervision and with his special permission. The station extends many yards along the foot of the cliff. We were much surprised, on digging through the earth, which appears to have washed in and filled up the mouth of the shelter, to find a deposit 8 or 10 feet deep of flint flakes or blades, more or less broken. Their principal value was in showing the extent of human occupation, either by a great number of people or for a long period of time, or perhaps both. After all the excavations made by Lartet in 1862-63 and by his followers in the twenty succeeding years, these flint pieces were found by us

in such numbers that they rattled under the stroke of the pick or mattock as though we had been digging in a dump heap of broken pottery.

Cro-Magnon.—*Cro-Magnon* is on the west side of the River Vézère, at the railway station of Les Eyzies, 16 miles south of Périgueux. The prehistoric station occupied very nearly the site of the present house. The station has been entirely excavated and destroyed. Here was found the celebrated human skull which has given its name to the prehistoric race of *Cro-Magnon*. These caves and shelters having been the habitations of prehistoric man, they



Fig. 18.

FLINT FLAKE (PALEO-
LITHIC), PROBABLY A
SAW OR KNIFE.

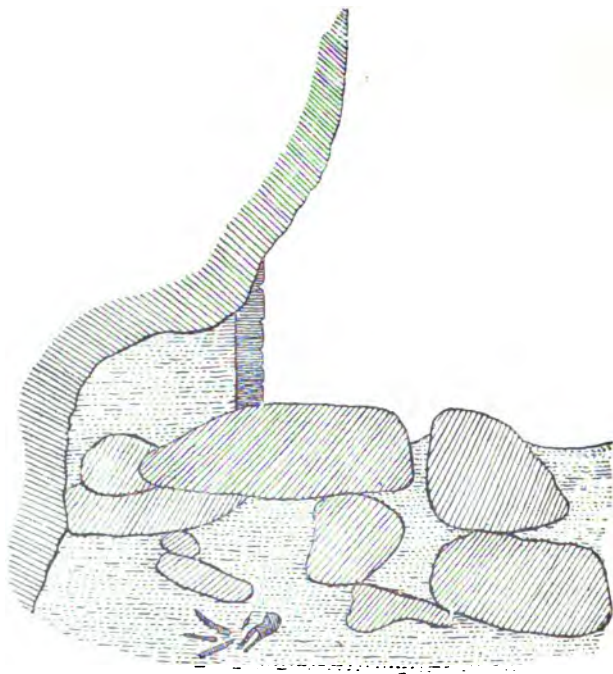
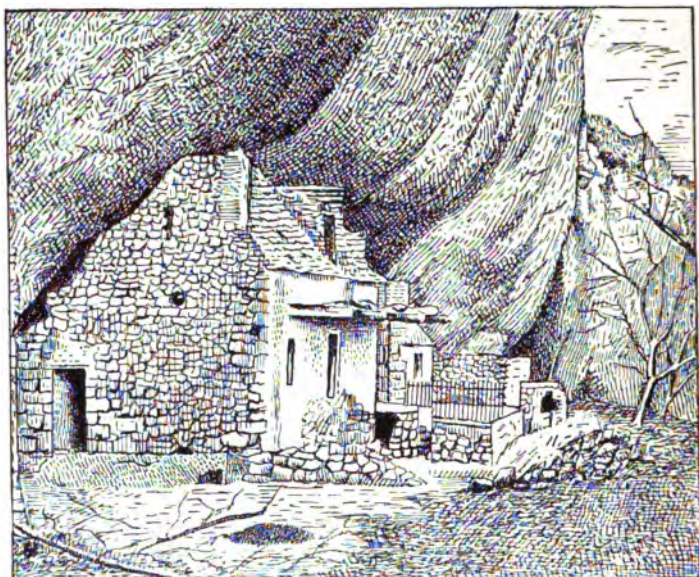
La Madelaine (Dor-
dogne), France.

Lartet and Christy. $\frac{1}{2}$ nat-
ural size.

ROCK SHELTER OF LA MADELAINE, RIVER VÈZÈRE, DORDOGNE.







PERSPECTIVE VIEW AND SECTION OF THE ROCK SHELTER OF LAUGERIE BASSE,
RIVER VÈZÈRE, DORDOGNE.

contain the broken or lost objects of his industry and specimens of his art. (See Plate 1.)

The culture of La Madelaine was similar to that of Laugerie Basse (See map, Plate 5), but Laugerie Haute had a somewhat different culture, and this caused La Madelaine to be chosen as the representative and to have given its name to the epoch.

Laugerie Basse.—Plate 12 is a perspective view and section of the rock shelter of Laugerie Basse. Many objects of prehistoric human industry and art have been found in it. It was undoubtedly occupied for a long period of time. The house shown was located on or over the entrance to the cavern, which, however, had previously been filled with fallen rocks and earth. The entrance for excavation of the cavern was through the house and under its floor. The principal work of excavation was done by M. Massenat, of Mailmont, near Brives (Correze). The overhanging rock, projecting about 45 feet, afforded the shelter. This precipice of rock extended with intervals for several miles up and down the river, with many other occupied caverns and rock shelters, which showed a dense population or long-continued occupation, or both.

Despite the employment of horn and bone, flint continued to a large extent to be used for implements. The scraper of the Mousterien epoch had its edge on the side, while in the Madelainien epoch the scraping edge had changed to the end (fig. 17), and this form continued into historic times. Flint flakes abounded during this epoch, some large, long, and thin, with sharp edges, probably used for knives (fig. 18); others small and fine, with delicately wrought corners and points (fig. 19 *a, b*), probably intended for drills.

Here we leave paleolithic flint chipping, and because the man of this epoch turned his attention to other manifestations of art, we have to follow him. The subject will receive further attention in the chapter on the Neolithic period.

ENGRAVINGS ON BONE, HORN, AND IVORY.

This epoch is most important in the history of art, marking as it does the earliest human expression of the beautiful, of art for art's sake. It has been said that this expression marks the first step in evolution from savagery. If so, this step was first taken during this epoch and in this locality, for here prehistoric art of the Paleolithic period made its first manifestation and attained its highest grade.

The art of this locality was indigenous. It was not an imitation, and it seems not to have been borrowed nor to have migrated. It appears to have been a manifestation of the natural art tendencies of the human mind.¹ It consisted sometimes of sculpture done in the round;



Fig. 19.
FLINTPOINTS OR DRILLS.
La Madelaine (Dordogne), France.
Lartet and Christy. Natural size.

¹ See Introduction, p. 302.

sometimes of etchings or engravings on stone, bone, or horn. If on wood, such specimens have decayed or been otherwise lost. Bone, horn, and ivory became known during this epoch, and were now first employed by man for æsthetic and decorative purposes as well as for utility.

Judge E. Piette, one of the most ardent and persistent explorers of the prehistoric stations of France, confining his investigations largely to the grottoes, caverns, and rock shelters belonging to the Paleolithic period, having spent twenty-five years in this pursuit, has made discoveries and formulated theories with regard to the arts and industries of the early prehistoric man in that country that are entitled to serious consideration.

He awards the fullest credit to the investigations of Lartet and Christy, of Vibraye, Franchet, Garrigou, and others. He admits the discovery of three types of human industry as found in the caverns of Le Moustier, Laugerie Haute, and Madelaine, and eulogizes De Mortillet for his creation of the Archeo-Ethnologic science; or as De Mortillet himself puts it, Palethnology.

Judge Piette concedes the importance of the discoveries and studies of these leaders, and joins their followers, now comprising all the students of the science in France and nearly all in Europe, and the rest of the world, in the belief now universally accepted that man occupied western Europe contemporaneously with the great mammals of the prior geologic epoch, now extinct, such as the three species of elephant, the cave bear, Irish elk, and *Rhinoceros merckii* and *tichorinus*.

The early explorers were so elated with the discovery of the many evidences of this early existence of man that they were apparently content to note only the differences in the objects of his art and industry found in the different caverns. Judge Piette pushed his investigations another step and sought to discover stratigraphic differences in every cavern explored. In this task he has been eminently successful, and has traced through the various strata of the different caverns the origin of human art and industry, its evolution, apogee, transformations, decline, and sometimes its disappearance. Out of all this he has, while adhering generally to the classification of De Mortillet, made some changes and given new names. He doubts if the origin of man or his first appearance as man is accounted for in De Mortillet's classification. So he gives to his earliest term the name of "*passage*," associating man with the *Elephas antiquus*, *E. meridionalis*, *E. primigenius*, and a pliocene fauna. His Chelléen epoch has the same fauna, with a predominance of *Elephas antiquus*, and all this he declares to have been preglacial.

His next grand division includes the Glacial epoch with the divisions of Mousterien, wherein man was associated with the *Elephas primigenius*, *Rhinoceros tichorhinus* and *Ursus spelæus*. This comprises the art and industry of the same epoch in de Mortillet's classification.

Piette's classification here differs from de Mortillet's, he inclining to use the names of animals and of industries rather than of localities, so instead of Solutréen and Madelainien he calls them Equidian, Taran-dian or Cervidian, and Hippiquian. But so far as these epochs relate to art he denominates the entire period as "Glyptique," and divides them, beginning with the earliest, according to their respective strata as found by him in the caverns, as follows: (1) Sculptures in the round; (2) sculpture in bas-relief; (3) engravings, *champlevé* and simple, needles, harpoons of reindeer and deer horn. This closes his period "Glyptique," and takes him into the epoch of transition at the close of the Glacial period. In the latter part the ancient animals have become extinct and are replaced by the modern fauna. His next sub-division, still in the Paleolithic period, he calls "Asylien," from the Grotte Mas d'Azil, the peculiar art product of which was the colored pebbles to be described in the paragraph on painting. During this last division of the period of transition the glaciers had disappeared, the climate had changed, and the reindeer and other cold-loving animals had departed. The classification of Judge Piette subsequent to this, though changed somewhat in form and name, is substantially the Neolithic or polished-stone age, the age of bronze, and the first age of iron, as now recognized by prehistoric archæologists.

Judge Piette says that the remains of *Equus* predominate in the lower strata in the caverns, while the remains of *Cervus* predominate in the upper strata or those next above; and for this reason he makes two principal divisions of his period Glyptique—Equidian and Cervidian. He draws from these facts the conclusion that there was a change in the food of man. During the earlier period he used more horse meat, which accounts for the larger number of bones; while in the later period he used a greater amount of deer meat, which accounts for the greater number of the bones of reindeer, deer, etc. From these circumstances and those growing out of them he speculates upon a change of climate. Horses, it is said, would only live in a moderately cold climate on plains producing grass and similar food. The reindeer, on the other hand, prefer dry and cold food, as moss and lichens, and they will thrive and increase in a climate where horses would perish. Piette certifies to the fact that the replacing of the horse by the reindeer is more complete in the caverns in the mountains than in those in the valleys and on the plains. One point made by Judge Piette is that much the largest number of sculptures in the round (which forms his first division) were in ivory, while the greatest number of engravings and other specimens of the Glyptique art were on horse bone and reindeer horn. This, curiously enough, is the order in which the animals furnishing the respective materials are agreed to have lived in that country—first the elephant tribe, mammoth, etc., then the horse, and lastly the reindeer.

It is not intended by the author to follow in this paper Judge Piette's

classification. It may be more correct than any other, but that has to do with archæology rather than with art, and so its consideration need not be here continued. Nor is it intended, in presenting specimens of art, to attempt any chronologic order of their appearance, nor to separate them into schools or classes. This may be done in the future, but the science of Prehistoric Anthropology is not sufficiently advanced to enable it to be done now with assurance of success. The prime fact with which we have to deal is that these specimens were made by man at a period of high antiquity, and that they show an unwonted ability in primitive art. We have here art for art's sake. Artists and art critics may theorize as to its origin, but here we have the hard fact.

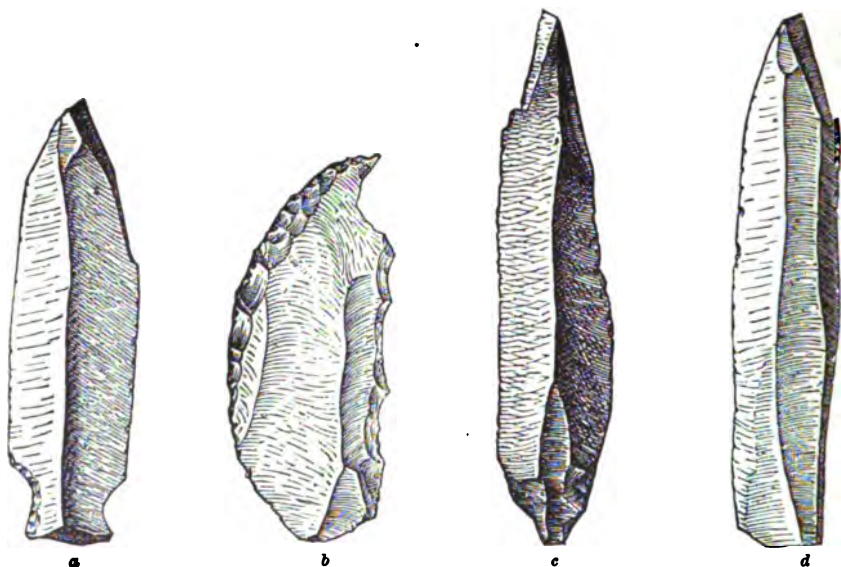


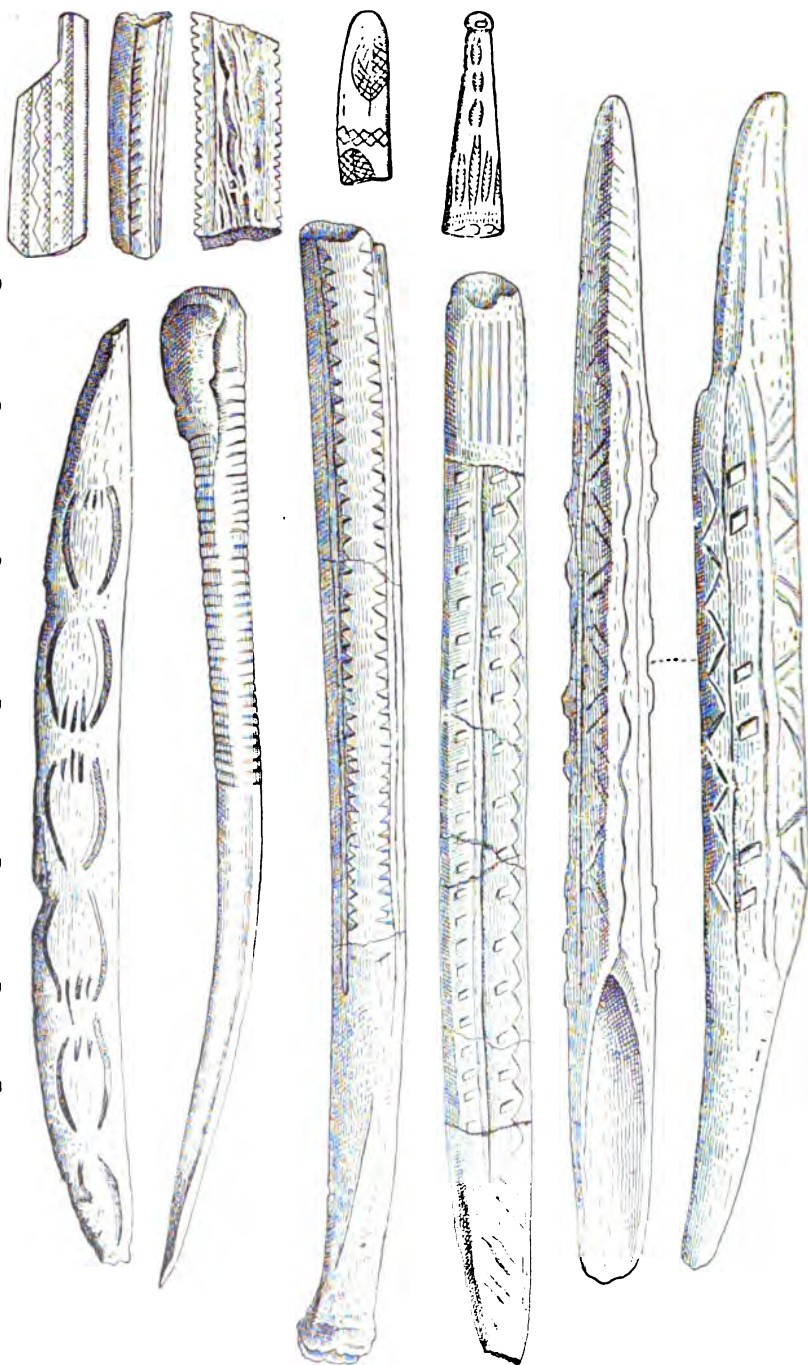
Fig. 20.

FLINT GRAVEES.

La Madelaine (Dordogne), France.

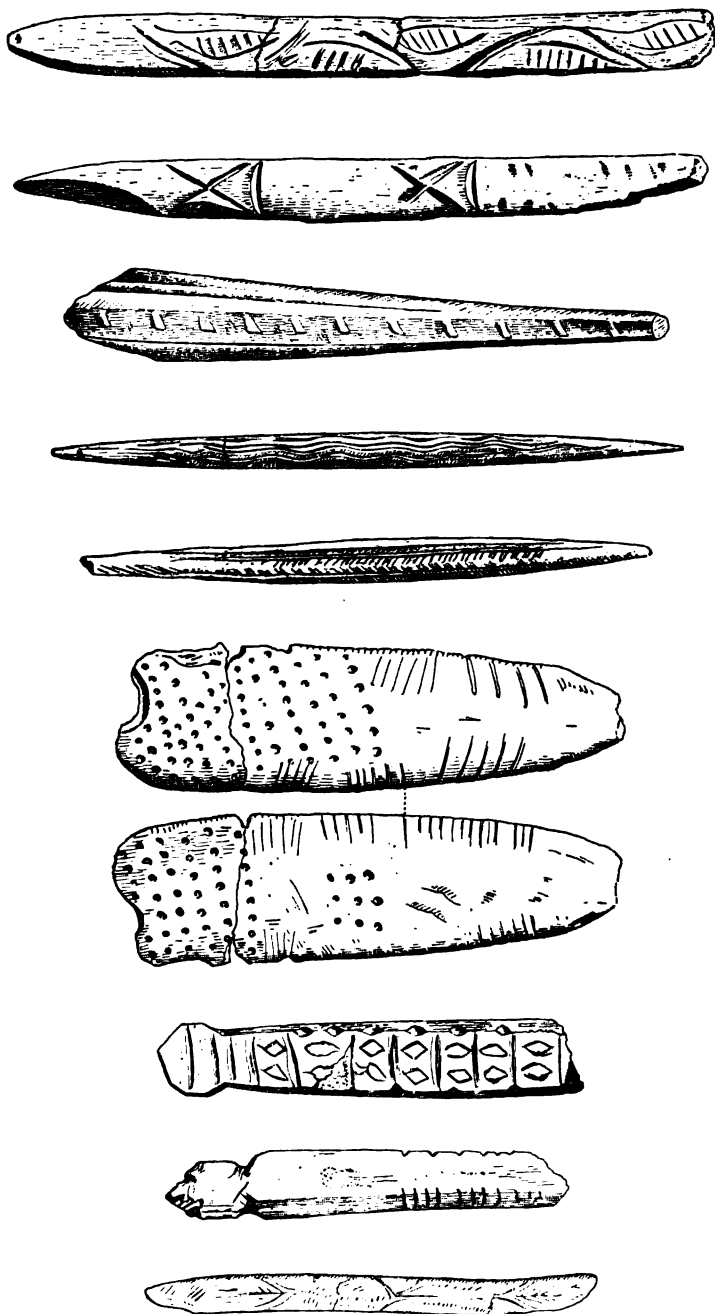
Larlet and Christy. $\frac{3}{4}$ natural size.

The most wonderful exhibition of art in this epoch was in the representation of animal life. Sometimes the animals are at rest, but many times they are in action. Hunting scenes are depicted in which the hunter, a man, is shown in pursuit of his game and in active conflict with it. In one a man is throwing a spear; in another the serpent bites his heel; deer are shown in action; the reindeer with his nose high in the air and horns thrown on his back; a reindeer browsing and representing a veritable landscape with perspective drawing. The engraving and sculpture represent the mammoth, the reindeer, horse, bison, musk ox, birds, fish, serpent, and others. Some of these are arctic animals now found only in cold countries, others are extinct. A mammoth was engraved on a plaque of ivory (part of his own tusk), a



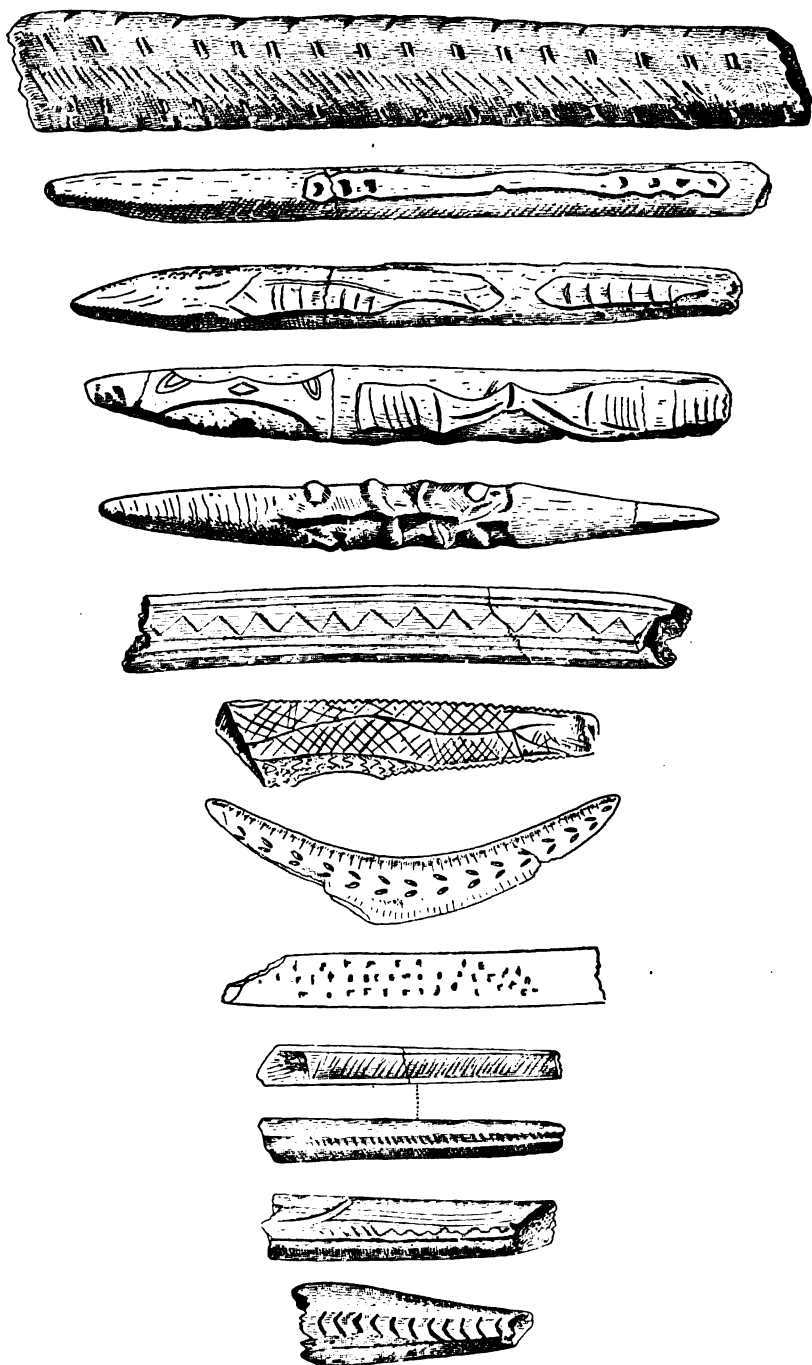
DECORATIVE GEOMETRIC AND CONVENTIONAL DESIGNS OF THE PALEOLITHIC PERIOD IN EUROPE.

† natural size.



DECORATIVE GEOMETRIC AND CONVENTIONAL DESIGNS OF THE PALEOLITHIC PERIOD
IN EUROPE.

‡ natural size.



DECORATIVE GEOMETRIC AND CONVENTIONAL DESIGNS OF THE PALEOLITHIC PERIOD
IN EUROPE.

† natural size.

cave bear was engraved on a pebble of schist, a poniard was made of reindeer horn, the handle being in the form of the reindeer himself. These all came from southern France, and are evidence of the existence of these animals in that locality, for the artist must have seen them before he could depict them. They are the first known drawings from life.

Gravers.—Fig. 20, *a, b, c, d*, represents gravers of flint. These gravers are not dressed to a sharp point from all sides, but have a V-shaped point, as does the graver's tool of to-day. We have many of the originals in the National Museum, of which some are quite worn, while others are sharp and could be now used to engrave the bones as in prehistoric times.

The implements and utensils of everyday use were decorated with an art by no means contemptible. The ornamentation of harpoons, daggers, and similar objects shows an appreciation of decorative art as applied to household or domestic uses not unworthy of the nineteenth century. These constitute the first or elementary series. The designs are geometric, and made by dots or lines arranged with greater or less regularity, straight, curved, or broken. The figures are formed in festoons, zigzags, hatched work, but more frequently in chevrons. With the employment of almost every kind of geometric design, forming elaborate combinations, we have to remark that the more simple—notably circles, crosses, or triangles—were not employed. (Plates 13, 14, 15.)

Harpoons.—The art work on harpoons exhibits considerable artistic ability as well as manual dexterity (fig. 21, *a, b, c, d*). The art work of these is displayed in the purity of the drawing, in the straightness of the lines, in the symmetry of the design, and in the general accuracy and truth with which it has all been executed. The main shaft of

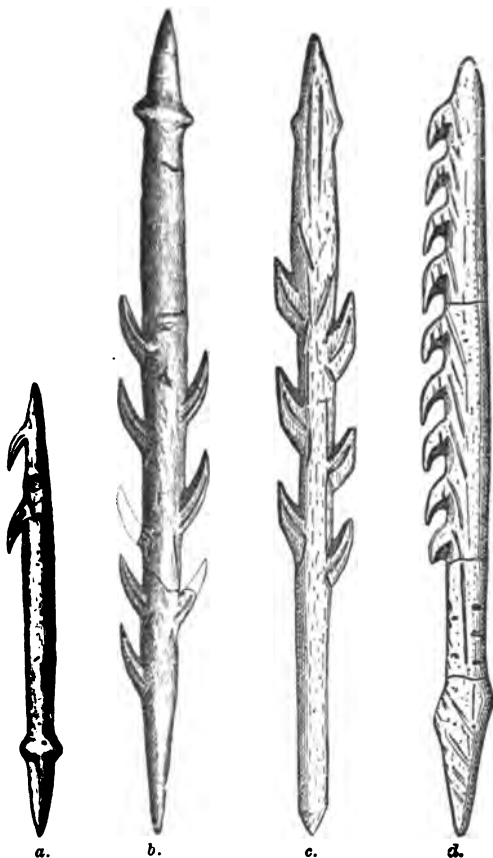


Fig. 21.

HARPOONS OF REINDEER HORN.

La Madelaine (Dordogne), France.

Lartet and Christy. $\frac{1}{2}$ natural size.

the harpoon is straight from one end to the other, while the barbs are symmetrically placed; whether opposite or alternated, their spaces are equal, they have the same form, and point in the same direction.

Animals.—The animals of this epoch were represented in great numbers, about three hundred specimens having been discovered, comprising nearly every animal known. There are some reptiles, more fish, a few birds, and many mammals. The reptiles are scarcely determinable. Of the fish, the salmon, the trout, and the brochet have been recognized. A swan was found at Laugerie Basse. There is a fair representation of what is probably the entire fauna of the epoch. The principal ones were the cave bear, mammoth, reindeer, horse, ox (two species, the urus and the aurochs), deer, mountain goat, antelope, chamois, wild boar, wolf, fox,

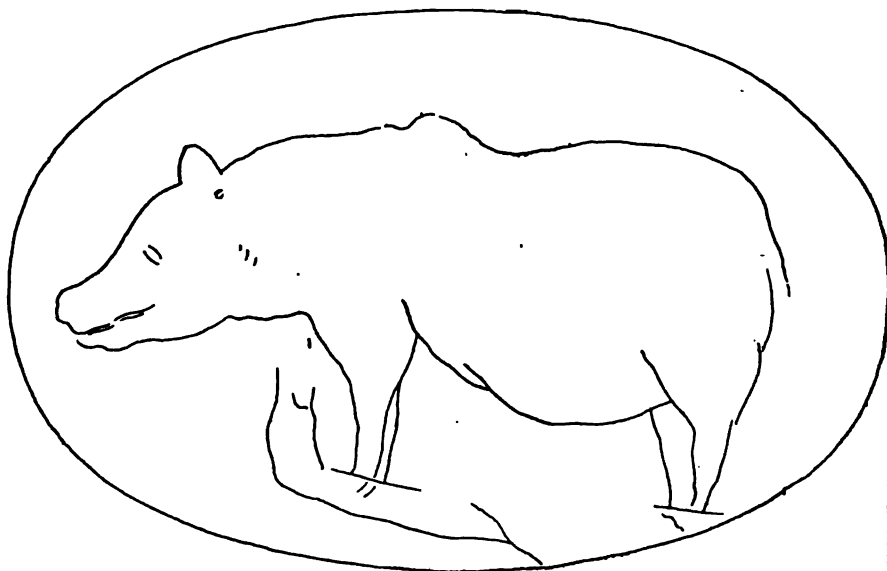


Fig. 22.

CAVE BEAR ENGRAVED ON A FLAT OVAL PEBBLE OF SCHIST.

Grotto of Massat, Ariège.

Original, Musée de Foix. Natural size.

bear, lynx, otter, seal, walrus, and rabbit. There are a few representations of animals as yet unrecognized. One is the small animal resembling a cat, engraved on both sides of the bone disk (fig. 58). To this list of animals, of course, man must be added.

The cave bear.—Fig. 22 is an engraving on a flat stone or water-worn pebble of schist, about 6 by 4 by 1 inches, found by Dr. Garrigou in the Grotto of Massat (Ariège), a few miles south of Toulouse. The original is in the prehistoric museum in Foix, where the author saw it. The characteristics of the animal are well represented; one can see its prominent forehead, the irregular line of its back, immense body, short and heavy legs. It is identified as the *Ursus spelæus*, or great cave bear, which occupied that country in numbers during the Quaternary geologic period. It is extinct and has been during all historic time.

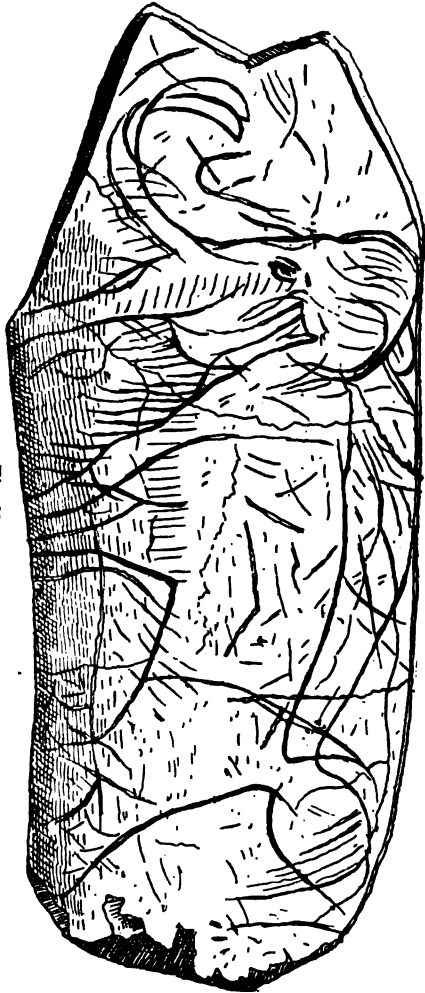
Its existence is only known from the finding of its fossil bones (fifty-seven individuals were found in the neighboring Grotto of l'Herm), and from this the only pictorial representation of it ever made from life. The engraving bears its own evidence of genuine antiquity. It shows a certain degree of art and will compare favorably in point of execution with the average representation in outline of such an animal in our natural-history school-books. The correctness of the drawing seems to be indisputable, for it corresponds exactly with the fossil skeletons of the animal. The United States National Museum possesses a skeleton of one of these animals in Anthropological Hall (Cat. No. 172850).

Mammoth.—Fig. 23 represents a mammoth, *Elephas primigenius* (Blum.), engraved on a laminated fragment of his own tusk. It is a thin, oblong piece of ivory, convex on the side according to the cylinder of the tusk, and slightly concave longitudinally according to its curvature. It was found at La Madelaine by M. Lartet, and was described in "Compte Rendus de l'Academie des Sciences," 1865. The original is in the Museum of Natural History in Paris. The lofty skull, the bulging and curved forehead, the curved tusks and shaggy hair, identify it satisfactorily. There have been many skeletons of the mammoth found in various parts of the world, all fossil. That from the Arctic regions of Siberia, found by a Russian merchant, is well known. It was brought down, reconstructed, and is now exhibited in the museum at St. Petersburg. The sketch of that specimen, made by the traveler who discovered it, was not better made than is this one, done by the cave dweller of southern France. It is so well done that one must believe the artist had seen the animal, if he did not make the drawing from real life.

Found by Lartet and Christy. Museum d'Histoire Naturelle, Paris. Cat. No. 99736, U.S.N.M. 1/2 natural size.

ENGRAVING OF MAMMOTH ON A FRAGMENT OF HIS OWN TUSK.

Fig. 23.



This paper has nothing to do with real mammoths, when or where existing. It deals only with artistic representations of the animal made by prehistoric man. Certain engravings of the mammoth have been found in the United States which are claimed to have been made by the aborigines. The author inserts them here, so that all pictures of this animal will be grouped together for comparison as works of art, and not at all with the contention that they belong to the same epoch, were made by the same people, or that they represent the same culture. The American specimens are inserted solely for convenience of comparison.

Mammoth (Lenape stone).—Plate 16 (fig. 1) shows the celebrated Lenape stone which has been described by, and received the approval of, Mr. Henry C. Mercer, Curator of American and Prehistoric Archaeology, Museum of the University of Pennsylvania.

This paragraph has been submitted to Mr. Mercer with a request for his criticism. He wrote the following:

Eleven years have passed, during which I have continually watched the subject. I have found no reason to doubt the genuineness of the Lenape stone. The specimen still in the possession of Col. H. D. Paxson is an isolated case that might well have deserved prolonged study on its merits.

At a time when uncertainty prevailed as to human antiquity in North America, as to the late survival of certain Pleistocene animals like the tapir, sloth, peccary, caetoröides, mastodon, and mammoth, and as to the true scope of Indian picture writing, this surprising document came to light suddenly near a center of archaeological study.¹ Not marred by any patent flaw, or notoriously treacherous association, it seemed to invite active investigation from the outset. But the position of those then responsible for the welfare of archaeology, who at little pains deposited an *onus probandi* on the shoulders of the witnesses for the stone and went on their way, has been negative from the first. To say again that they have not visited the locality, have not addressed themselves to the pros and cons, and have ignored three other carved stones found at the same locality, is to reiterate a conviction that they have slighted the subject.

It has been objected that, while the object itself was original, the design or engraving thereon was modern. Mr. Mercer still believes in the genuine aboriginal character of the engraving as well as of the object.

No argument is here made on this question, which belongs to archaeology more than to art, but the author sees no reason to doubt the authenticity of the design or engraving, and it is presented as an example of aboriginal American art, representative of a mammoth or mastodon. Mr. Mercer wrote an elaborate description of the stone and its discovery, entitled "The Lenape Stone, or the Indian and the Mammoth," published in 1885, and the reader who desires to examine the details and arguments is respectfully referred thereto. The circumstances, so far as concerns us, are that the aboriginal implement of slate represented in plate 16 (fig. 1), of the form called gorget or perforated tablet, drilled and broken as shown, was found in the years

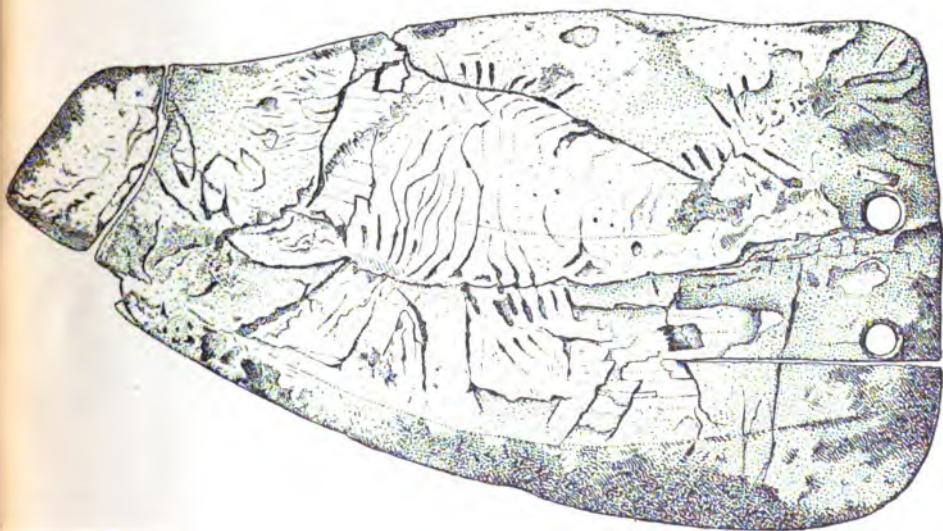
¹ Doylestown, Bucks County, Pennsylvania.



THE LENAPE STONE, A SLATE GORGET WITH FIGURE OF MAMMOTH OR MASTODON ENGRAVED THEREON.

Found by Bernard Hansell, near Doylestown, Bucks County, Pennsylvania.

Paxon collection. $\frac{3}{4}$ natural size.



FULGUR SHELL, WITH FIGURE OF MAMMOTH OR MASTODON ENGRAVED THEREON.

Found by M. Sarault at Hollyoak, Delaware.

Cat. No. 148313, U.S.N.M. Natural size.

1872 and 1881, being turned up by a farmer while plowing on his farm, $4\frac{1}{2}$ miles east of Doylestown, Bucks County, Pennsylvania. The two pieces were found in the same spot, but at different times, with an interval of nine years between.

Mammoth (Dr. Cresson, Delaware).—Plate 16 (fig. 2) is another aboriginal drawing of a mammoth in America. It was found by Dr. H. T. Cresson and Mr. Saurault, in the neighborhood of Holly Oak Station, Wilmington and Baltimore Railroad, Delaware, on the surface of a tilled field which had been covered for manuring purposes with peat taken from what Dr. Cresson calls “the fallen forest layer in one of the adjoining estuaries of the Delaware River.” The engraving represents a mammoth resembling somewhat that found at La Madeleine (fig. 23). It was engraved in much the same manner, and might

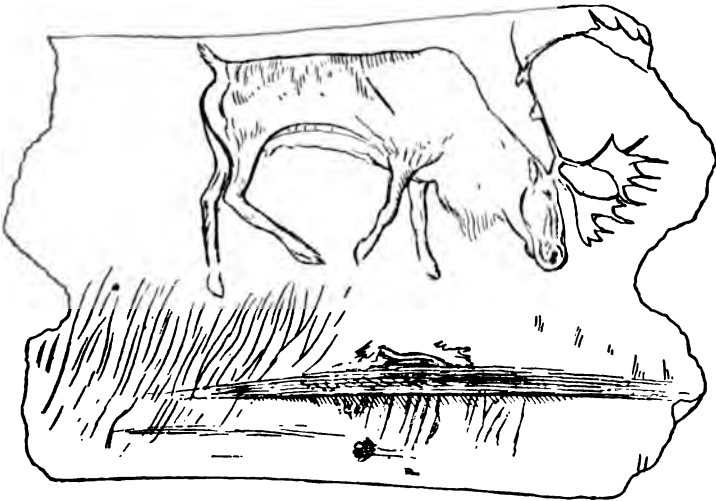


Fig. 24.

REINDEER BROWSING, ENGRAVED ON REINDEER ANTLER, BOTH SIDES REPRESENTED.

Grotto of Thayngen, near Lake Constance, Switzerland.

$\frac{2}{3}$ natural size.

have been done with the same kind of flint gravers. It is on a Fulgur shell, indigenous to America, and found on the coast from Delaware to Florida. The authenticity of this engraving has also been attacked. Dr. Cresson and Mr. Saurault are both deceased, and no other than the internal evidence presented by the object itself and the declaration of its finding as aforesaid can now be furnished. Without stopping to argue for the genuine aboriginal character of the engraving, it is only fair to say that the appearance of the object and of the engraving are indicative of antiquity, and that it presents no traces of modern work. There are no indications of its having been doctored or in any way tampered with, and, like the former disputed engraving, it is presented (subject to future discoveries) as a genuine example of aboriginal art.

The reindeer.—Fig. 24 represents a reindeer (*Rangifer tarandus*) brows-

ing. This specimen is from the cavern of Thayingen, near Lake Constance, Switzerland. It is engraved upon a piece of reindeer antler and possibly was the fragment of a *bâton de commandement*. The piece here represented is, taken in its entirety, probably the best art picture yet found belonging to the Paleolithic period. The

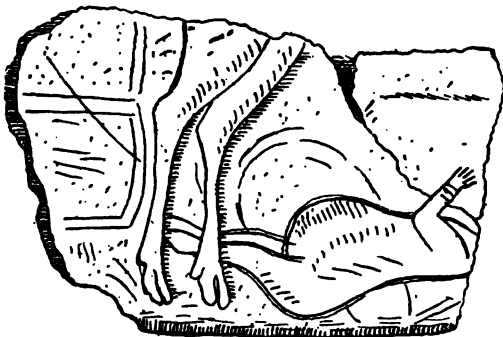


Fig. 25.

REINDEER (HIND LEGS) AND BODY OF A WOMAN, ENGRAVED ON A FRAGMENT OF SHOULDER BLADE. REVERSE, RUDE SKETCH OF HORSE.

Found by Landesque at Laugerie Basse, Dordogne.

Collection of Judge E. Piette. Cast, Cat. No. 99741, U.S.N.M. $\frac{2}{3}$ natural size.

one view shown represents both sides of the antler, as though it had been unrolled. Spread out thus, it has the appearance of a veritable landscape with water in the foreground, herbage around it, and the grass, etc., in the background where the reindeer is feeding. This specimen is engraved two-thirds natural size. The size and outline of the body with development of the antlers

denote a full grown male. The peculiar the pinched form of the belly, apparently exaggerated by the artist, is common after the rutting season. The head, horns, and body lines are true and correct. The eye is of the proper form and is rightly placed. The attitude of the animal indicates him to be walking slowly, browsing or grazing as he goes.

Fig. 25 is an illustration (of which others will be shown) of the use of a piece of material to repeat different objects or views, sometimes each from a different point of view, and one overlaying the other. This is a fragment of shoulder blade. It represents a woman's form which has been engraved, and over it afterwards a reindeer of which the two hind legs only remain. This specimen was found at Laugerie Basse and belongs to the collection of Judge Piette. The woman

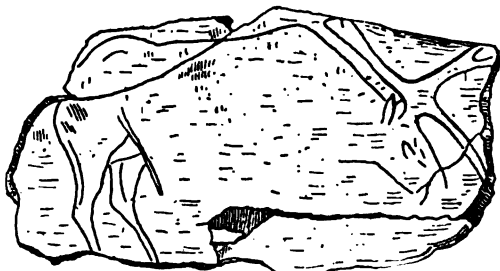


Fig. 26.

REINDEER WITH JAVELIN IN HIS FLANK, ENGRAVED ON THE RIB BONE OF OX.

Found by E. Douliot, Grotto of Carnac, Dordogne.

Musée St. Germain. Natural size.

has a collar about her neck and bracelets upon her arms. There are marks said to represent hair, but which may be only the effort of the artist to represent the rounded appearance of the human form instead of presenting it in profile. The foregoing specimens are particularly fine art work. They illustrate the proposition emphasized and repeated

throughout this chapter, of the natural desire of man in his original state of savagery to enjoy and possess objects which to him were beautiful, and that he was thus prompted to make them in his chosen style of beauty. These specimens represent art for art's sake. In them savage man was at play with art, and apparently for the sole purpose of gratifying his natural taste for beauty—to satisfy his natural desire for beautiful things. And the same is true of many other specimens. There is no pretense of utility in these. They indicate the use by aboriginal man of such materials as he had within reach to make objects the beauty of which would give him pleasure. This was equally true whether the objects, as harpoons, bone points, spears, batons, were for use or were, like the foregoing, only pictures to be hung on the wall.

Fig. 26 represents an engraving on several fragments of the rib of an ox or bison. These fragments were found in the Grotto of Corgnac, Dordogne, and being joined together, were found to fit and to represent a reindeer with a javelin or arrow in his right flank or hip. It was collected by E. Douliot and is in the Musée St. Germain. It has the same pinched appearance of the belly as noticed in the Thayingen specimens. Although imperfect and incomplete, it shows with a few strokes and in no uncertain manner the characteristics of the animal.

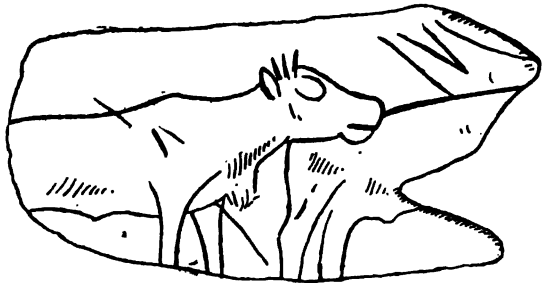


Fig. 27.

REINDEER (?) ENGRAVED ON ONE OF THEIR OWN METATARSALS.

La Madelaine. Lartet and Christy.

British Museum. Cast, Cat. No. 8144, U.S.N.M. Natural size.

Fig. 27 is an engraving made upon a fragment of the metatarsal of a reindeer, showing parts only of two animals. The principal one is in view and has been taken for a reindeer. This has been decided by the general outline, the form of the shoulder, and the tuft of hair characteristic of the male reindeer, which appears on the brisket. In front of the ear is an indication of antlers, a slender horn without brow antler, which would indicate a young animal. The hatchings or hair markings on different parts of the body indicate the projections of either bone or muscle. There are imperfections to be noted about the head, if a reindeer was intended to be represented. Though well set on, the head is short, the angle of the lower lip, compared with the chin, is too salient, the nose is dilated as it is not in the reindeer and the eyes are immoderately large.

The horse.—The bones of the horse have been found in some of these caverns in great profusion, and it would appear that this animal spread generally over western Europe in Paleolithic times. Fossil bones have been found which belonged to other varieties of the horse, now extinct.

Whether they were ancestors of the horse or not, as is said by Prof. Edward D. Cope in his celebrated "*Phenacodus Primævis*," has never been satisfactorily determined. There has been found, in the Grotto of Thayingen in Switzerland, near Lake Constance, an engraved bone (fig.

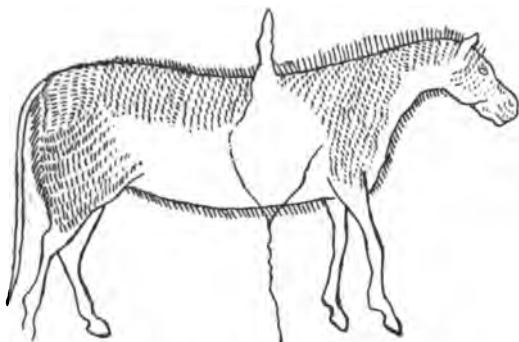


Fig. 28.

AN ANIMAL OF THE HORSE SPECIES, ENGRAVED ON BONE.
Grotto of Thayingen, Switzerland.
Collection, Piette.

28) representing an animal of the horse kind, but different from any known variety. It may have been a horse, the drawing of which owes its peculiarity to the inability of the artist, but one can hardly think so, for, while in form, shape, and general appearance this might be, yet he could hardly have so misrepresented the tail. It is, however, remarkable that in all those peculiar-

ities wherein it differs from the horse it should be found to correspond with the anoplotherium, an animal belonging to the Upper Miocene and reported by Prof. W. Boyd Dawkins¹ as having been found in western Europe. There is a similarity between them which, to say the least, is remarkable. Fig. 29 represents a horse on a fragment scarcely more than an inch long. It was found at Bruniquel, and the original is in the British Museum. Horses were frequently represented. They are all peculiar, but the peculiarities are reproduced in every engraving. Their heads are large beyond the proportions of the modern horse; they have hog manes bristling upright; the tail is thin and small, and stands out nearly straight. These were attributed to the peculiarities of the artist rather than to the horse, but since the discovery and reconstruction of the skeleton, notably that



Fig. 29.

HORSE ENGRAVED ON BONE.
Cavern of Bruniquel (Tarn-et-Garonne), France.
British Museum. Natural size.



Fig. 30.

PONY HORSE.
From one of the Dordogne caves.
 $\frac{1}{2}$ natural size.

muzzle, straight back, rat tail. It is on one of the engraved bones from Dordogne of which we have seen so many.

Bâtons de commandement.—These are of stag or reindeer horn, with

tion of the skeleton, notably that by M. E. Chantre in the Zoologic Museum in Lyons, these peculiarities are found to belong to the animal and to justify the fidelity of the artist. Fig. 30 represents one of the prehistoric pony horses, with large head, carried low, big

¹ Early Man in Britain, p. 33.

one or more holes drilled through the center, transversely. On the beam of specimen, fig. 31, *a*, *b*, is an engraving of a string of four horses following each other. The specimen comes from La Madelaine



Fig. 31.

Bâton de commandement (a, obverse; b, reverse). A SHED REINDEER ANTLER, ONE HOLE DRILLED, DROVES OF HORSES FOLLOWING, THREE ON ONE

SIDE, FOUR ON THE OTHER.

La Madelaine, Dordogne.

Lartet and Chabry. Musée St. Germain. Cat., Col. No. 8122, U.S.N.M. 1/2 natural size.

and was found by Lartet. This figure shows two sides, obverse and reverse, of the same implement. It is the shed antler of a reindeer. The first tine has been cut off apparently with a flint knife or saw;

three horses have been engraved on one side, four on the other. The horn is of such conformation as to afford a grip at the lower or heavy end, like a pistol grip; while the hole is so placed as to permit the insertion of the index finger. It is evident from inspection that this hole was bored subsequent to the engraving of the horses, for it passes through and cuts off the head of one horse on one side and of two horses on the other. Fig. 32 is a representation of a fragment of a similar bone with a horse engraved thereon and a hole bored, likewise after the engraving. Fig. 33 represents the shed antlers of a young reindeer from La Madelaine, showing the amputation of three tines, and with four holes. The holes in this, contrary to the former and many others, have either been bored before the decoration, or it was designed in advance for them. The stem or beam has been cut away laterally on each side so as to make a flat surface for the boring of the holes. The top or concave side bears thirty-three transverse notches or cuts, mostly equidistant, though some are arranged in pairs.

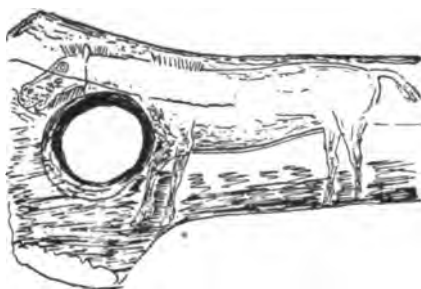


Fig. 32.

HORSE ENGRAVED ON FRAGMENT OF REINDEER
ANTLER, WITH HOLE BORED AFTER DECORATION.

$\frac{1}{2}$ natural size.

A number of these implements have been found in the Paleolithic caves of western Europe. Their use is unknown and they are so peculiar that nothing should be omitted which will serve for their elucidation. Various uses have been suggested for them, as splitting soft wood, barking trees, or as weapons for game and for war. It has been suggested that they were to be held aloft in battles in the hands of the chief like

an imperial standard, and so they have been called in French "*bâtons de commandement*," but none of these uses have been proved. The last has attached itself to them as a name, but possibly only in default of a better. Other persons have considered them as mere weapons. M. Pigorini, director of the Kircheriano Museum in Rome, suggests they might have been used as bits for horses' bridles. Implements analogous and made also of reindeer horn are found among the Eskimos and are said to have been used principally to kill game when near enough to be struck with it in the hand. Some travelers have given to them the name of "slave killers," from their alleged use by the Eskimos.

Lartet noticed in his early explorations that they were lacking "in the more ancient caves or stations which were characterized by the presence of lanceolate (leaf shaped) implements and by older fauna." He remarks "their absence in the stations Aurignac (Haute Garonne), La Chaise (Charente), Des Fées (Allier), and Gorge d'Enfer. On the contrary, in stations having the barbed bone harpoons, these batons

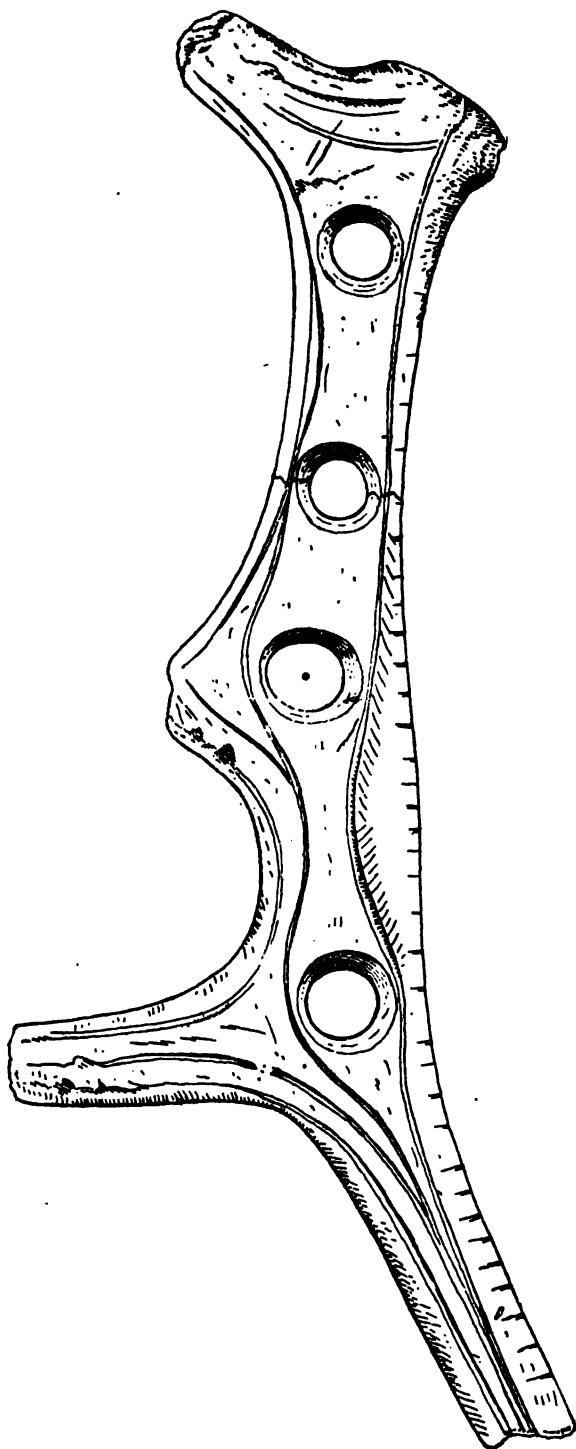


Fig. 82.

Bâton de commandement, with four holes, bored before decoration. Made of the shed antler of a young reindeer.

La Madelaine, Dordogne.

Lartet and Chirac. Cat. Cat. No. 813, U.S.N.M. $\frac{1}{2}$ natural size.

were found, and he mentions the rock shelters of Bruniquel (Tarn et Garonne), Le Chaffant (Vienne), and the caverns of Massat (Ariege), Les Eyzies (Dordogne), Mont Salève (Geneva, Switzerland), and Schussenried (Wurtemberg), as having them.

Fig. 34 is an important and interesting specimen of these *bâtons de commandement* of reindeer horn. The two figures represent the opposite sides of the same piece. They are, however, turned end for end, and were discovered in 1886 in the Grotto of Montgaudier, not far from Angoulême, in the valley of the River Tardoire (Charente), near the western coast of France, by M. Paignou, who worked in company with M. Albert Gaudry. The archæologic stratum contained another engraved bone, bone needles, polishers, an ivory point, scrapers, and a magnificent Solutréen leaf-shaped blade.

M. Gaudry, the eminent paleontologist of the Museum of Natural History, Paris, received this *bâton de commandement* and it is now displayed in the museum. He made an extended description of the object before the Academy of France in July, 1886. In November he continued the account of his excavations in this grotto, and reported what he found in the lower strata—specimens of bones of the *Rhinoceros tichorhinus*, corresponding to and contemporaneous with the Moustérien epoch. Below this *bâton de commandement*, in the same stratum and associated with it, were bone points and a barbed harpoon, so M. Gaudry concludes that the stratum containing this baton was subsequent to the epoch of Moustier and contempora-

neous with the cavern of Chauffaud, in the same neighborhood. He says of this specimen:

It is made of reindeer horn and is pierced with a large hole at the end. It is covered with engravings which show the certainty of the artist's mind and the sentiment of

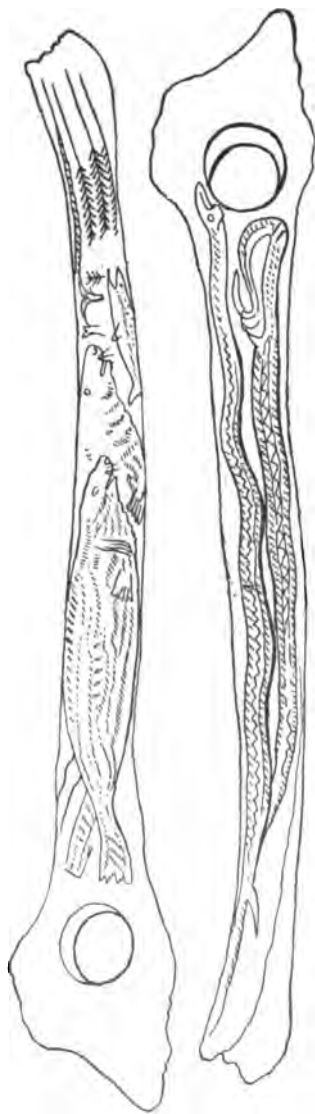


Fig. 34.
Bâton de commandement, with one hole, of REINDEER HORN, ENGRAVED WITH FISHES. OBVERSE AND REVERSE.
Grotto of Montgaudier.

Found by M.M. Paignou and Gaudry. Musée d'Histoire Naturelle, Paris. $\frac{1}{2}$ natural size.

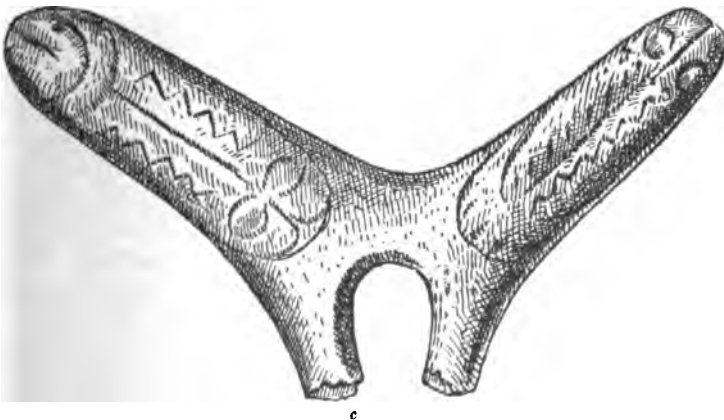
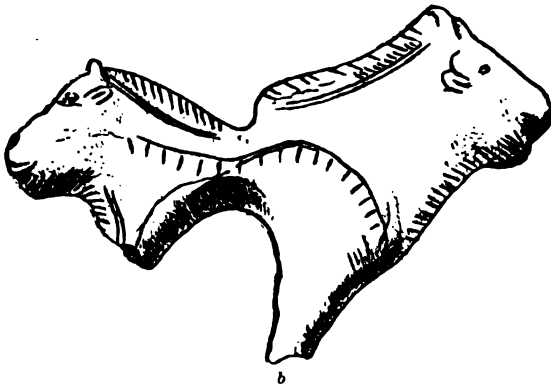
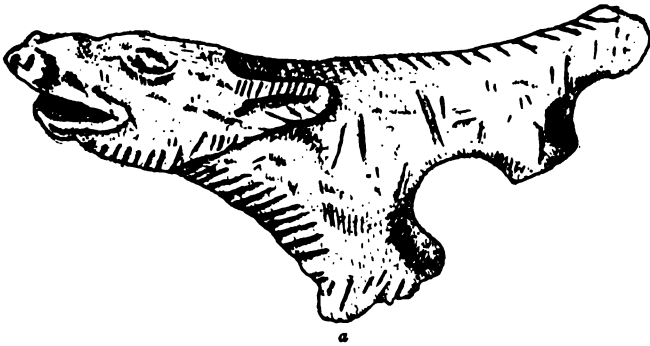


Fig. 35.

Bâtons de commandement (?) OF REINDEER HORN FRAGMENTS, BORED, CARVED, AND DECORATED WITH ANIMAL AND GEOMETRIC DESIGNS.

Laurie Basse.

Collection, Massonnet. a. Cast, Cat. No. 136645, U.S.N.M. Natural size. b. Cast, Cat. No. 136640, U.S.N.M. $\frac{1}{2}$ natural size. c. Natural size.

the forms which he depicts. The work is so fine that it requires the magnifying glass to bring out all its beauty. One face of the baton represents two seals, such as inhabited the sea off the coasts of France. One of them is seen in its entirety with his four members. The hinder members, so singularly carried among these animals, are exactly rendered, each foot having five toes. The size and extent of the tail is plainly to be seen. The head is delicately executed. The muzzle with its mustache, the mouth, the eyes, the hole for the ear, all indicate a degree of artistic ability. The other seal is not to be seen in its entirety; it is larger and has indications of long hair about its neck. The fore foot is exact. In front is a fish, which is either a salmon or a trout. Its spots are shown and the ventral fins are affixed to the abdomen.

On the opposite side of this baton are two animals, long and slim, the longer being 34 centimeters, or $13\frac{1}{2}$ inches. They are not complete, but one shows its head and the other its tail. M. Gaudry thinks they represent eels, possibly serpents; *non constat*, but they may have been sea serpents. All these are represented on other specimens from various caverns and grottoes. Engravings of the seal have been found in the cavern of Varier (?), Haute Savoy, by M. Gosse, one in the Grotto of Gourdan, by Judge Piette; the salmon, or trout, in the cavern of Goye, Belgium, by M. Dupont; and the eel, or serpent, in Laugerie Haute, by Lartet and Christy.¹

Implements have been found which, while similar in form, are in such fragmentary condition that one can not determine their function, but they persistently represent the hole bored as herein described. Some of these should be classed with sculptured rather than engraved objects, but cross reference should be made so that they may be studied in both classes. Fig. 35, *a, b, c*, shows three of these objects, all bifurcated, and of which *a* and *b* represent animal heads on the end of the bifurcation, while *c* represents a different decoration. The relation between these fragmentary implements, with their respective holes, and the former implements, *bâtons de commandement*, is as yet unknown.

The bison or ox (urus or aurochs).—Fig. 36 represents a man chasing an aurochs or bison. It is engraved on reindeer horn, comes from Laugerie Basse, was found by M. Massenat, and belongs to his collection. The man follows the bison and is in the act of throwing a spear or harpoon at him. Action on the part of both is shown, and the chase is well represented. It is an artistic representation of a prehistoric hunting scene. The position of the arms, especially the right, is awkward. The man has a sardonic grin. The marks, possibly representing hair, nearly cover his body. Whether they were really hair or were intended only to show light and shade and the rounded parts of the body has never been fully decided. M. de Mortillet believes them to represent hair and, therefore, that the man of this epoch was covered with hair. This piece furnished the basis for the reproduction of the man of the Cavern period displayed in the anthropological section of the Paris Exposition of 1889. (Plate 18*b*.) Fig. *a* of this plate represents the artists of the Chelléen epoch displayed at the same time and place.

¹ *Materiaux*, 1864, pp. 8-9, 73-74.

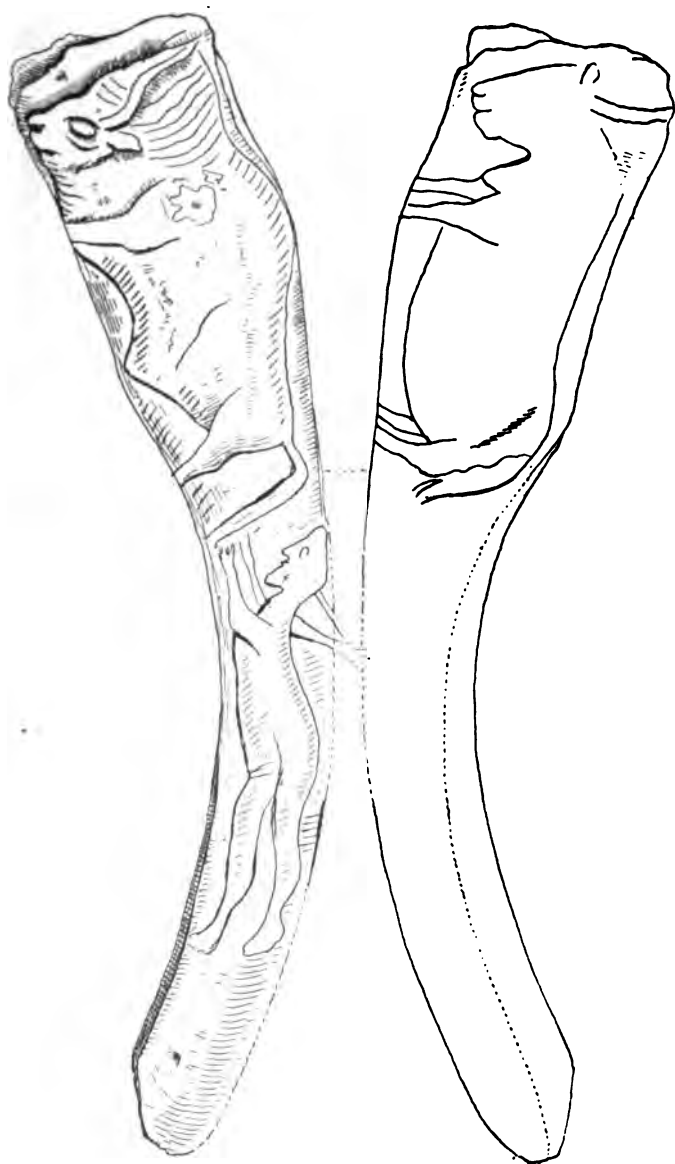


Fig. 36.

BISON AND MAN, ENGRAVED ON REINDEER ANTLER. HUNTING SCENE. OBVERSE AND REVERSE.

Laugerie Basse, Dordogne.

Collection, Museum. Calif. Cat. No. 99140, U.S.N.M. *§* natural size.

Calves.—Fig. 37 represents an engraving on reindeer antlers from Langerie Basse, collected by Massenat. The figures are three calves' heads in a row. The reindeer horn has been flattened by cutting or

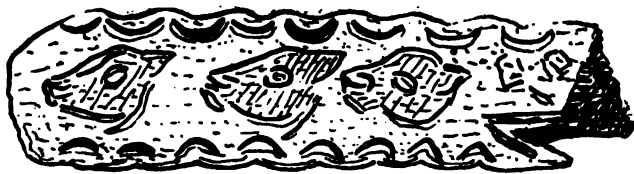


Fig. 37.

THREE CALVES' HEADS, ON REINDEER ANTLER, BOTH SIDES THE SAME. FRAGMENT OF HANDLE OF PONIARD.

Langerie Basse.

Collection, Massenat. Cast, Cat. No. 99857, U.S.N.M. Natural size.

scraping on the sides, and the engraving done on the surface. The object probably served as the handle of a poniard, but the blade is broken off. The top and bottom edges of the handle have been wrought into festoons, with crescents engraved opposite each point of the festoons. The sculpture is entirely ornamental, except so far as it may roughen the handle for prehensile purposes. The opposite side of the handle is similarly engraved.

Fig. 38 represents an engraved bone from Langerie Basse. The engravings are supposed to be calves, as in fig. 37.

It was one of the peculiarities of the art work of this epoch that in such examples as we are now considering the animals or heads engraved followed each other in single file. They appeared to be always uniform in size, height, age, sex, and species.



Fig. 38.

CALVES' (?) HEADS ENGRAVED ON BONE.

Langerie Basse, Dordogne.

Collection, Massenat. Natural size.

Ruminants (?).—Fig. 39 is one of those uncertain animals classed by Lartet and de Mortillet as ruminants, leaving the species undetermined. Lartet says:¹

The size and shortness of the shoulder, while excluding the reindeer, the stag, and

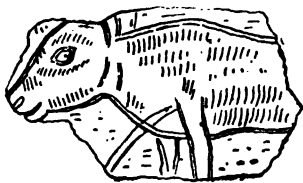


Fig. 39.

RUMINANT (?) ENGRAVED ON FRAGMENT OF REINDEER HORN.

Les Fyzies, Dordogne.

Musée St. Germain. Natural size.

the horse, might yet serve for a bovine animal, but the fracture at the attachment of the horns deprives us of the means of judging if it be of this character. The withers do not seem high enough for the aurochs; or, at least, they would do only for a young individual. The marks for hair, indicated on different parts of the body, are also distributed with intelligence for the purpose of making the drawing more effective.

The specimen was found by Lartet and Christy in the Grotto Les Fyzies, and is in the Musée St. Germain. De Mortillet believes that the mark on the left shoulder represents an arrow or javelin.

Fig. 40 is an engraving on a reindeer's brow antler palm, found by Lartet in Langerie Basse. The fracture is old. The fragment bears a bold sketch made by no uncertain hand, of the hind quarters and

¹ Reliquiæ Aquitanicæ, description of plates, p. 14.

barrel of a large bovine animal. That it is bovine is indicated by the smallness of the tail, straightness of the hocks, advanced position of the male organ, and the sudden rise at the withers; unfortunately the fracture occurs where the long, shaggy mane, determinative of the species, ought to begin; but the foregoing are all characteristic of the bison. There is no drawing upon the opposite side.

The specimen represented by fig. 41 is remarkable in that it was discovered and displayed long before any person in Europe suspected the existence of prehistoric man. This specimen was found in 1824, by M. Brouillet in the Grotto of Chaffaud, in the valley of the Charente. M. Brouillet was a notary at Charroux. He kept this specimen in his collection until the year 1851, when he sent it to the Musée Cluny. The specimen remained there, under the catalogue number of 2467, along with other objects found at the same time—bits of flint, bone points, harpoons, etc.—without attracting attention to its (or their) prehistoric character. It is of reindeer horn and has been broken into three pieces, two of which only remain together. It bears the en-

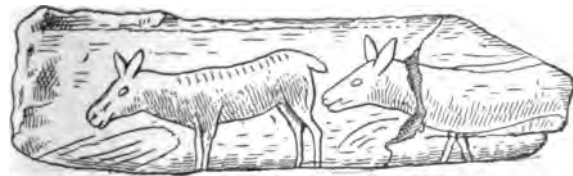


Fig. 41.

HARTS OR DOES, FOLLOWING, ENGRAVED ON REINDEER HORN.
Found by M. Brouillet, 1851, in Grotto of Chaffaud, Charente.
Musée Cluny. $\frac{1}{2}$ natural size.

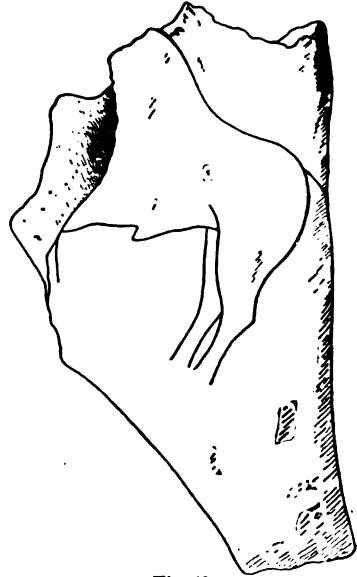


Fig. 40.

BOVINE ANIMAL, ENGRAVED ON REINDEER'S
BROW ANTLER PALM.

Laurie Basse, Dordogne.

Lartet and Christy. Cast, Cat. No. 8141 U.S.N.M.
 $\frac{1}{2}$ natural size.

graving of two animals, one following the other; the one in front is complete, standing, and at rest, the chin or nose prominent, the lips hanging, and the ears straight and long. The dorsal vertebræ are indicated by a series of vertical marks. The animal has no horns and has the appearance of a hart or doe—the female of the stag or deer kind. The second animal, which follows the first, is cut in two across the shoulders by the breakage of the bone. Its head is finer and its muzzle is more pointed. The ears are straight. This specimen was discovered in the Musée Cluny by M. Gabriel de Mortillet, and his son Adrien made a drawing and a full report of it, which was published on November 25, 1885, in the Magazine l'Homme. This specimen, therefore, is evidence incontrovertible of the genuineness of this and similar objects made by prehistoric man and found in the caverns

which he occupied of western and southern France. This was found thirty years before anyone had an idea of even the existence of pre-

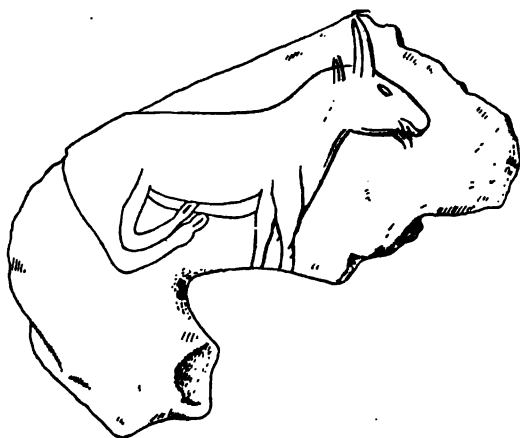


Fig. 42.

IBEX OR WILD GOAT, ENGRAVED ON REINDEER'S BROW ANTLER PALM.

Laugerie.

Lartet and Christy. Cast, Cat. No. 8149, U.S.N.M. $\frac{1}{2}$ natural size.

Ibex.—Fig. 42 is the palm of a reindeer's brow antler, found by M. Lartet at Laugerie Basse. It bears the nearly entire engraved outline of a horned animal. The horns point upward with a slight backward curve; a short distance behind the horns is an indication of ears; below the chin is a tuft of hair or beard. The croup, tail, and fore feet are destroyed by fractures. The hind legs are sadly distorted in whatever position the animal may be represented; even if he was engaged in scratching himself with his feet, it was impossible that he should scratch his belly with both hind feet at once. But all the characteristics mentioned point to the possibility of an ibex or similar animal. Fig. 43 represents another engraving, also supposed to be of the ibex or goat family, made on a fragment of a reindeer's brow antler palm. Figs. 44, 45, and 46 are engravings of animals of the goat or antelope tribe. Fig. 45 represents the head of a large saiga (antelope). It was engraved on bone and was found by Judge Piette in the Grotto of Gourdon (Haute Garonne). This animal has been extinct in that locality throughout historic times. Fig. 46 represents an ibex engraved on reindeer horn. It was found at Laugerie Basse and is in the collection M. Massenat at Brives. This animal has migrated to the high altitudes.

Flowers, leaves, etc.—Designs imitating flowers, leaves, and branches

historic man—certainly that long before it was suggested that prehistoric man made or used such objects or ornaments. It was deposited in the principal museum of Paris—still before the discovery of prehistoric man—where it has remained practically until the present time without suspicion of its relation to, or use by, him. It would have remained there unknown but for the fortunate discovery of M. Mortillet.

Ibex.—Fig. 42 is the



Fig. 43.

IBEX OR GOAT, ENGRAVED ON FRAGMENT OF REINDEER'S BROW ANTLER PALM.

Dordogne.

Cast, Cat. No. 136641, U.S.N.M. $\frac{1}{2}$ natural size.

were engraved on harpoon or similar points of bone, horn and ivory. One on a reindeer antler represents flowers with eight and nine petals, respectively.¹ There is a long branch with its leaves on the *bâton de commandement* on reindeer horn from the cavern at the foot of Mont Saleve, Geneva, and the branches with their leaves on the *baton* of Montgardier (fig. 34).

Fig. 47 represents a truncated harpoon or dart from La Madelaine. In the center and lower part are two representations of what are believed to have been flowers, the upper one with nine petals. Nearer the top is an animal form resembling the outstretched skin of a carnivore with a narrow snout and thick tail like the fox or some allied animal. On the opposite side (not shown in the figure) are two horses' heads placed back to back. This figure is taken from "*Reliquiæ Aquitanicæ*,"² Fig. 5 on the same plate represents a similar implement, on which a horse is carved partly on side and partly on edge, which is unusual in these objects.



Fig. 44.

HEAD AND NECK OF
IBEX, ENGRAVED ON
REINDEER'S ANTLER.

Laugerie Basse, Dor-
dogne.

Lartet and Christy. $\frac{1}{2}$ nat-
ural size.



Fig. 45.

HEAD OF SAIGA (ANTE-
LOPE) ON A FRAG-
MENT OF BONE.

Grotto of Gourdon.

Judge Piette. $\frac{1}{4}$ natural size.

Marine animals.—Fig. 48 represents an engraving found by M. Massenat at Laugerie Basse. It is on bone and is rude and incomplete. It is supposed to represent a whale. Fig. 49 shows a seal engraved upon the canine of a cave bear. It is from Sordes cavern (Landes) and belongs to the collection Chaplain-Duparc. Fig. 50 represents an ovibus (?), while fig. 51 represents a fish.

Some of the engravings found in these caverns, while undoubtedly showing human intention and handiwork, are difficult of identification. If we were studying this from the view-points of a biologist or a zoologist it might be necessary to use greater precaution in the naming of the animals, but as they are here considered from an artistic view-point, the special name of the animal is not important. (Figs. 51, 52, 53, 54, 55, 56, 57, and 58.)

Man.—The paleolithic artist was not so successful in his representations of human kind as he was of certain animals. The figure of a man chasing an aurochs (fig. 36) has been described. Fig. 59, on a beam of reindeer horn, represents man, but not in an artistic manner. He is in the midst of a line of horses with a serpent or eel at his heels. It is the fragment of a *bâton de commandement*, was found by Lartet and Christy in the rock shelter of La Madelaine, and is now in the Musée St. Germain. On the other side are figured two calves' heads, one following the other, as usual. Other representations of human form will be noticed in the



Fig. 46.

HEAD OF WILD GOAT
ON REINDEER HORN.

Laugerie Basse.

Collection, Massenat. $\frac{1}{4}$ nat-
ural size.

¹ *Reliquiæ Aquitanicæ*, plate B, IX.

² Page 70, B. plate IX, fig. 4.

paragraph on sculpture (fig. 69). Fig. 60, *a, b*, represents a fragment of harpoon head of reindeer horn on which has been engraved representations of human hands. The two figures represent the obverse and reverse of the same specimen. The four fingers are represented, but the thumb is omitted. Fig. 61 is a faint representation in profile of an inartistic head from Langerie Basse, collection Massenat.



Fig. 47.
HARPOON OR DART, WITH ENGRAVING OF OUTSTRETCHED SKIN OF A FOX (1). TWO FLOWERS.
La Madelaine.
Lartet and Christy. Natural size.

Examples of art practice.—These art manifestations were intended by their makers not alone for utility, as in the decoration of implements, weapons, and utensils, but they display a love of art for art's sake. Many of them, as already shown, appear to have been made for practice, or from a natural and innate love of the beautiful. They are mere essays, in which the artist used the same piece without any attempted relation of one figure to the other. The sketch of five reindeer, Marquis de Vibraye's collection (fig. 62), is an example. Another is the sketch (fig. 64) of eight animals, horses and deer, from the cavern of Lortet. Each of these specimens consists of a single piece, the lines of each figure running into each other. The drawings have been done on different planes, so that some are upside down, some are complete, others incomplete. The ancient artist utilized his material, as does the artist of to-day when he uses the same canvas again and again. The mammoth engraved on a lamination of his own tusk, and the bear on a flat pebble, are done solely for their art; while the sculpture of the mammoth and reindeer, decoration of the handles of daggers and poniards, are such utilization as put one in remembrance of similar work done by Benevenuto Cellini.

Fig. 62 represents an engraving upon a fragment of schistose slate found at Langerie Basse by Franchet, and belongs to the collection of the Marquis de Vibraye. It represents five reindeer engraved from different points of view. Two of the animals are shown upright, while three others are represented upside down. One sketch is complete and is well done. Nearly every person has seen similar sketches in modern studios; the artist practices by making different sketches or fragments on the same canvas.

These specimens are evidence of the art tendency of prehistoric man, at least in this locality and epoch. While the evidence points in that direction and is hardly explainable upon any other theory, yet the number of these specimens has hardly been sufficient to establish the

theory in every country inhabited by Paleolithic man. If a greater number of art works had been found, or if the distribution had been more extensive, the general proposition would be better established. We are to remember that in our search for the evidences of prehistoric



Fig. 48.
 WHALE (?) ENGRAVED ON BONE.
 Langerie Basse.
 Collection, Mammont. $\frac{1}{2}$ natural size.

man we are but groping in the dark; we have no, or but few, indications as to the locality of the traces of his existence, and so we may have missed those evidences greatest in number and most important in bearing.

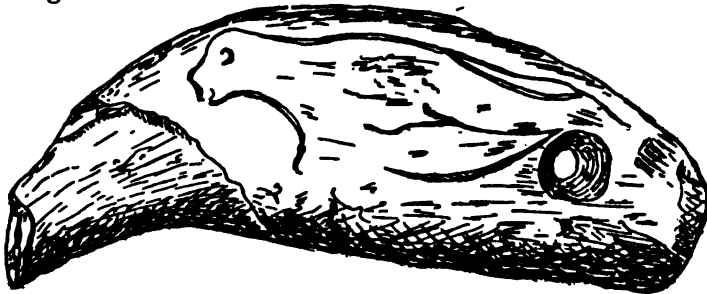


Fig. 49.
 SEAL ENGRAVED ON BEAR'S TOOTH.
 Cavern of Sordes (Landes.)
 Collection, Chaplain-Duparc. Natural size.

Fig. 63 is another specimen of artistic essay, an engraving on bone from Langerie Basse, in the collection of M. Gustave Marty, Toulouse. It is a fragment of shoulder blade, which we have seen was a favorite material with the prehistoric artist. Its surface is large and flat, and was convenient for the engraver. The artist has made divers essays, and has represented the legs of the horse in various positions and attitudes, always in action, possibly on the trot. Not being satisfied with them one way, he has represented them in another. May not this specimen suggest evidence of the artistic longing of him who may have



Fig. 50.
 MUSK-OX.
 $\frac{1}{4}$ natural size.



Fig. 51.
 FISH.
 $\frac{1}{2}$ natural size.

been an engraver and designer of renown, whose reputation may have resounded along the banks of the Vézère, up and

down the Pyrenees, in much the same way that artists from these localities, possibly his descendants, are figuring in the world of art in the expositions and museums of to-day?

Fig. 64 represents another series of engravings in the same tableau.

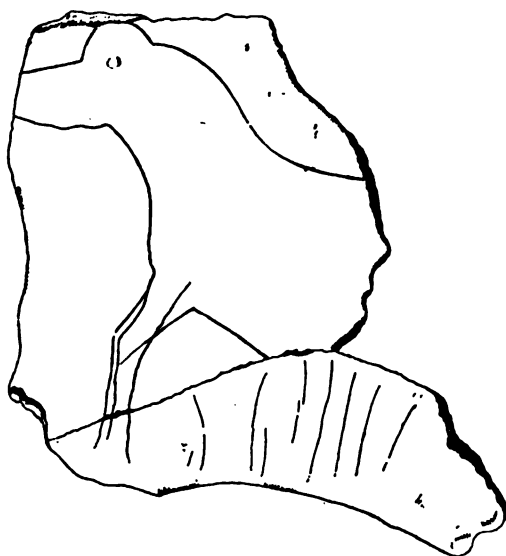


Fig. 52.

ENGRAVING ON BONE FRAGMENT OF UNCERTAIN ANIMAL.

Cast, Cat. No. 14870, U.S.N.M. $\frac{1}{2}$ natural size.

It contains specimens of *equidæ* and *cervidæ* in all postures and from different points of view. This specimen is from the Grotto of Lortet (Haute Pyrenees) and belongs to the collection of Judge Piette. Fig. 65 represents similar sketches in the collection Massenat and from Laugerie Basse. These are all "art for art's sake."

SCULPTURE.

The paleolithic artist did not confine his efforts to the fine arts of drawing or engraving, but included sculpture, and his manual dexterity and artistic abil-

ity were more successful in this direction than we would have supposed.

Fig. 66 represents a poniard made from a single piece of reindeer



Fig. 63.

ENGRAVING ON BONE FRAGMENT OF UNCERTAIN ANIMALS. PROBABLY REINDEER, FOLLOWING EACH OTHER.

Grotto of Massat (Ariege).

Collection, Cartail Lac. $\frac{1}{2}$ natural size.

horn. The weapon is about 16 inches in length. The blade was first sawed from the reindeer horn longitudinally, then cut or scraped to a point. It is intended for thrusting and not for cutting. The handle is sculptured to represent a reindeer. The blade is a prolongation of the hind legs, the fore legs are drawn close to the belly, and, with the body, form the handle, which can be held firmly, while the head of the animal forms the pommel. The nose is thrown up, which brings the horns on the back, to which they are attached. While the sculpture of this specimen may not be so fine or delicate as some others, or may have deteriorated by use or exposure, yet the general outline is correct and

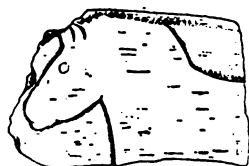


Fig. 54.

ANIMAL ENGRAVED ON BONE.
UNCERTAIN.

the animal is well represented. This specimen was found in Laugerie Basse by Lartet and Christy, and belongs to the Musée St. Germain.

Fig. 67 shows one of the most important specimens of sculpture yet found belonging to Paleolithic man.

It is sculptured in the round and represents a reindeer. It was the handle of a poniard or dagger and is quite long enough to be easily and firmly held. The reindeer is shown in a conventional manner and in a position suitable for the purpose indicated, much the same as

was the former one (fig. 66). The head is thrown back, the nose up, the horns flat upon the back and brought out in relief, the fore legs drawn to the front and the hind legs drawn up and to the rear. Their extension formed the blade. The specimen is ivory, was found at Bruniquel

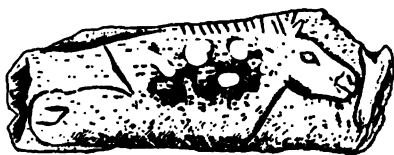


Fig. 65.

ENGRAVING OF ANIMAL, UNCERTAIN.

Cast, Cat. No. 99056, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 66.

ENGRAVING OF REINDEER ON BEAM OF REINDEER HORN.

La Madelaine.

Lartet and Christy. $\frac{1}{2}$ natural size.

(Tarn-et-Garonne), belonged to the collection of M. Peccedean de l'Isle, and formed part of the later purchase by the British Museum. It is somewhat remarkable that the finest work of this kind done by the prehistoric man should have been for the handles of daggers or pon-

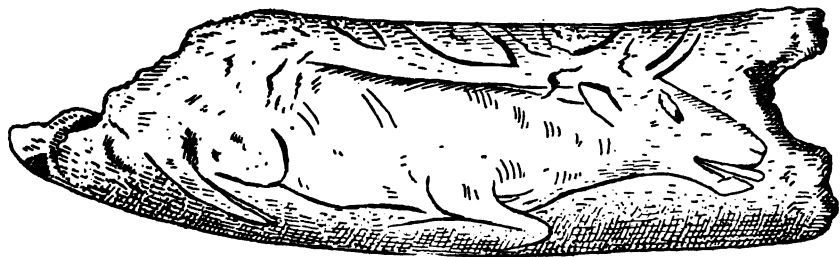


Fig. 67.

FRAGMENT OF STAG HORN, WITH PORTION OF HOLE DRILLED IN ONE END, AND ENGRAVING OF UNCERTAIN ANIMAL, PROBABLY STAG (*Cervus elephus*).

Engraving on opposite side of sketches

La Madelaine, Dordogne.

Lartet and Christy. Cast, Cat. No. 136628, U.S.N.M. Natural size.

iards. Some of the most celebrated artists, gravers, and sculptors of mediæval and modern times have employed their talents in much the same direction, and some of their chef d'œuvres have been the handles of daggers, poniards, and swords. Fig. 68 represents a sculpture of a mammoth on the broad part of a reindeer horn. It is the

handle of a poniard, comes from Bruniquel (Tarn-et-Garonne) and was found by M. Peccedean de l'Isle. This gentleman was an indefatigable searcher. He has made several profound and long-continued investigations. He made almost the entire excavation at the cavern of Bruniquel, and it has been, like several others, emptied; all the earth

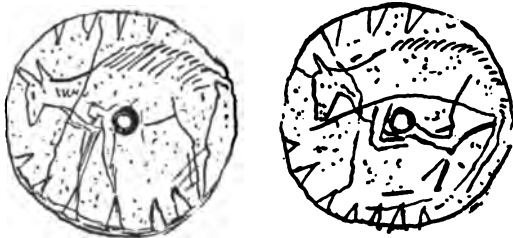


Fig. 58.

DISC OF BONE. ANIMAL UNCERTAIN, RESEMBLING A CAT, WITH GEOMETRIC DESIGNS FOR DECORATION.

Laugerie Basse.

Collection, Hardy, Dieppe, France. Natural size.

or débris taken out, sifted, and examined. His collection of these prehistoric engravings and sculptures has lately been purchased by the British Museum, and now forms part of its display of the arts and industries of paleolithic man. I had no right to ask what price the British

Museum paid for this collection, but when I saw it in Toulouse its owner demanded for it 40,000 francs (\$8,000), and the British Museum must have paid nearly that amount. This specimen was the handle of a poniard, the blade of which had been broken off. The tusks of the mammoth are laid up by the side of the elongated muzzle and are

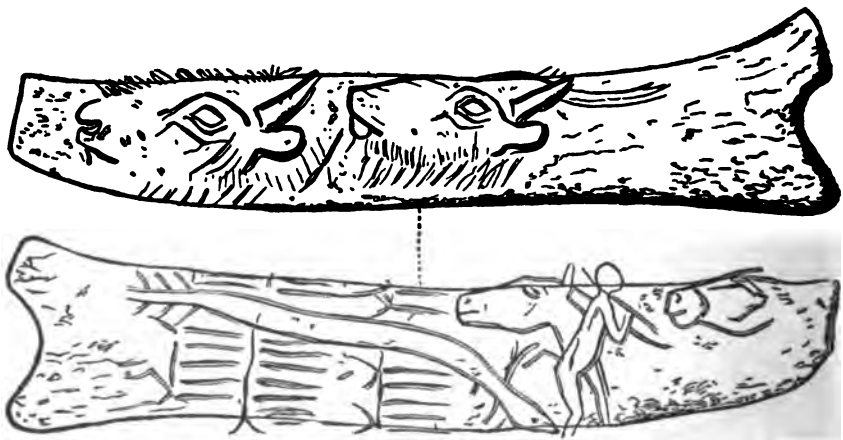


Fig. 59.

FIGURE OF A MAN WITH A STICK OR STAFF ON HIS LEFT SHOULDER ENGRAVED ON A FRAGMENT OF *bdton de commandement*, OF REINDEER HORN. TWO HORSES AND A SERPENT.

La Madelaine, Dordogne.

Lartet and Christy. Musée St. Germain. Cast, Cat. No. 136964, U.S.N.M. $\frac{3}{4}$ natural size.

represented in a conventional manner. The feet are brought together, owing to the requirements of the material. The tail is represented as curled up over the back, which proves it to have been a mammoth rather than an elephant. The tail was broken by the artist in manufacture and, in order to repair it, a hole was drilled down through the backbone and a new tail inserted. The representation of it here shows

the tail displaced; not in its proper position, as was the original when I saw it. Fig. 69 represents a fragment, important in its lesson on paleolithic art. It is a female figure sculptured in ivory. It is without head or arms and almost without feet. The breast is flat, the sexual organs exaggerated, and the hips prominent. It was found at Laugerie Basse and belongs to the collection of Marquis de Vibraye.



Fig. 60.

(a) FRAGMENT OF HARPOON OF REINDEER HORN ENGRAVED WITH TWO HUMAN HANDS, ONE ON EACH SIDE.

La Madelaine, Dordogne.

Lartet and Christy. British Museum. $\frac{1}{4}$ natural size.

(b) HUMAN HAND ENGRAVED ON A FRAGMENT OF HARPOON OR REINDEER HORN.

La Madelaine, Dordogne.

Lartet and Christy.

Judge Piette's persistence and success as an explorer into the prehistoric stations of the Paleolithic period in France have already been mentioned. One of his most extensive and successful explorations was in the cavern of Brassempouy at Chalosse (Landes). The usual stratification of occupation was found, beginning with the early Paleolithic at the bottom and progressing successively through the later epochs toward the top. The mammoth and rhinoceros, cave bear, cave hyena, and reindeer were found in their respective strata. Ivory was sufficiently plentiful to be dug out by the spade full. Worked points of bone and horn, flint points, scrapers, and flakes, and similar evidence of human occupation abounded. Engravings on bone and horn were found as in other paleolithic caverns in the district. In stratum E, about 18 inches in thickness and at a depth of 11 to 12 feet, specimens of the human form were found sculptured in the round from ivory. The collection of Judge Piette contains nine statuettes of the human female figure in ivory, seven from Brassempouy, one from Mas d'Azil, and one from Laugerie Basse. They were divided into two groups. One represented women, fleshy, gross, with breasts pendant, abdomen round and protuberant, and thighs firm and heavy. One of these Judge Piette has named the Venus of Brassempouy. The second group were the reverse of all this, with figures thin and straight, without protuberances, and slight representation of flesh or muscle, having much the same appearance as fig. 69. One of the latter group, more complete than any other, represented a female head covered with a capuchin bonnet.



Fig. 61.

HUMAN HEAD.

Laugerie Basse.

Massenat.

Reproduction of these figures without special license has been interdicted, but anyone can see them in the report.¹

Fig. 70 represents, in a rude and conventional manner, a human head

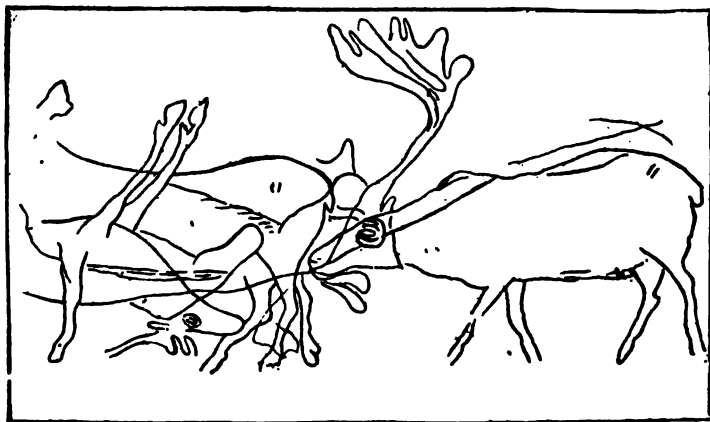


Fig. 62.

FRAGMENT OF SCHISTOSE SLATE WITH FIVE REINDER ENGRAVED THEREON, SIMPLY UNFINISHED AND FROM DIFFERENT VIEW POINTS. ART TRIALS OR SKETCHES.

Laugerie Basse.

Found by Franchet. Collection Marquis de Vibraye. $\frac{1}{2}$ natural size.

sculptured from a fragment of reindeer horn 2 or 3 inches long. It was found by Abbe Bourgeois in the Grotto of Rochbertier (Charente), and is in the museum of the Ecole d'Anthropologie, Paris. It is from the

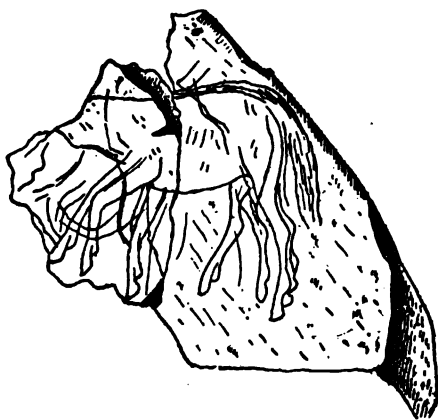


Fig. 63.

ENGRAVINGS ON BONE, TRIAL SKETCHES.

Laugerie Basse, Dordogne.

Collection Marty. Toulouse. $\frac{1}{2}$ natural size.

same department as the *bâton de commandement* of Montgardier (fig. 34). Fig. 71 represents a fragment of reindeer horn of which two tines or palms have been sculptured in the form of horses' heads. It is from the Grotto Mas d'Azil (Ariege) and belongs to the collection of Judge Piette.

Figs. 72 to 77 represent other specimens of Paleolithic sculptures from divers caverns of the period in the same general localities as those heretofore figured. They show different objects and do not require separate descriptions.

The engravings and sculptures found in excavations of the caverns of this epoch have been, for the most part, but the *débris*—broken and rejected pieces. They have been found principally among the ashes from the hearth, and are rarely perfect or complete. During this

¹L'Anthropologie, VI, 1896, plates I-VII; VII, 1897, plate I, p. 168.

period there does not appear to have been any care or preservation of anything for future generations, for there were no tombs, no burials, no monuments, and, except the caverns, no habitations. There appears to have been neither opportunity nor incentive to preserve such objects. But in the fragments we can recognize the artistic feeling of the people. It is even contended by some investigators that different schools of art



Fig. 64.

HORSES AND DEER, TRIAL SKETCHES ON FRAGMENT OF SHOULDER BLADE.

Grotto of Lortet (Haute Pyrenees).

Collection, Piette. $\frac{2}{3}$ natural size.

can be recognized in different localities; that the art of the Pyrenees was different from that of the Dordogne, and the same between the caverns of Switzerland and Savoy and those of western France. The animals represented have been done with sufficient exactness to enable us to determine what was intended. M. de Mortillet has said that while we are here in the presence of the infancy of art it is far from being the art of an infant, and MM. Cartailhac, Chauvet, Piette, Perrot, and

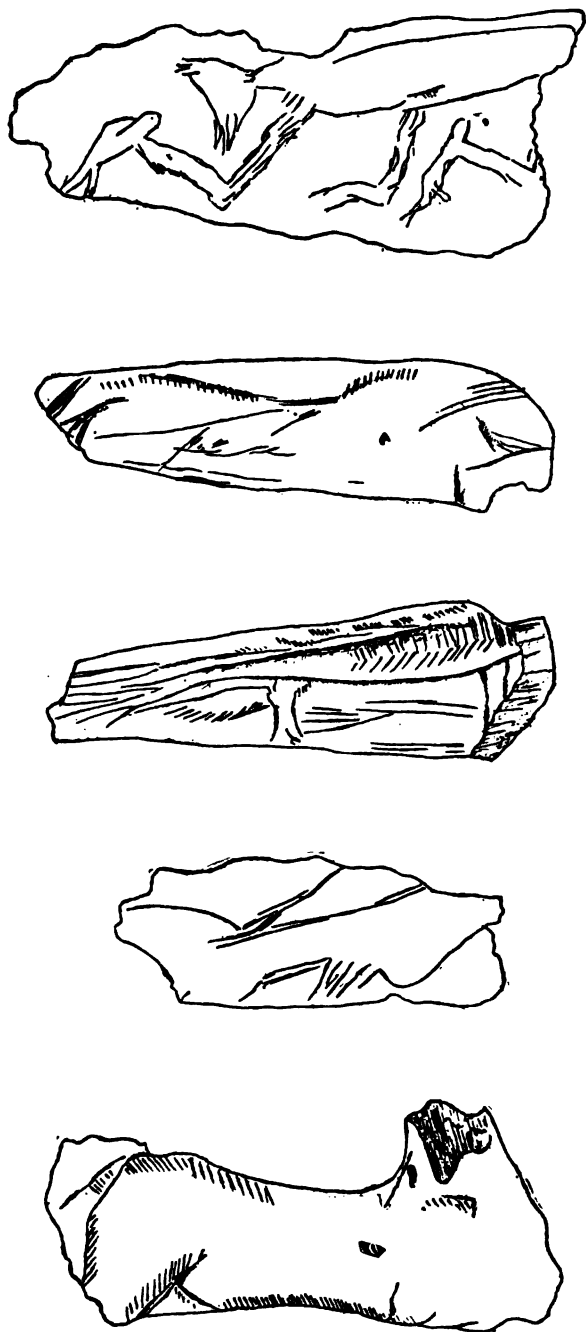


Fig. 65.

VARIOUS UNCERTAIN ANIMALS, ENGRAVED ON BONE, TRIAL SKETCHES.

Laurie Basee.

Collection, Massena.

the others who have written upon this subject have followed him in this. These, with other introduced specimens, show the innate desire of man for things beautiful and his natural wish to make them so. Philosophers, psychologists, and even anthropologists have theorized and speculated as to what aboriginal or natural man may have thought, wished, or desired in originating art, and they will continue to do so; but we are, by this work, brought face to face with the solid and irrefutable fact of what he did. The artifacts are our only evidence in this regard. We are dealing with the prehistoric. There is no history, no written record, no record at all, other than these objects. As by them only do we know of the existence of man at this epoch, so by them only can we discover the origin of the art by which they were made and the thoughts, wishes, and desires of the man who made them.

In order to justify any speculation concerning the ratiocination or psychologic manifestations of primitive man in matters of art or decoration, it is proper we should first know as much as possible of the facts of those manifestations. Almost the sole purpose of this memoir is to collate and present these facts. Its title declares this purpose. With mere speculations it has little to do, but in the presentation of facts concerning the origin of human art as shown in its earliest known manifestations it makes serious claims.

The specimens of engraving and sculpture may be divided as follows: (1) The engraving by simple lines cut in plain surfaces which corresponds to the engraving of our own time; (2) engraving more or less in relief, and (3) sculptures in the round, representing human or animal figures. Piette reverses their order and contends that they occurred thus.

METHODS OF ENGRAVING AND SCULPTURING.

The manner of working would seem to have been as follows: With the aid of flint instruments, which may have been knives, flakes, points, scrapers, or what not, the surface of the material was prepared by the removal of the outside or rough portion. The reindeer horn was preferred to that of other deer, probably because its surface was smooth



SCULPTURED PORTION OF REINDEER HORN, THE HANDLE REPRESENTING THE REINDEER HIMSELF.

Collection, Museum, Calif. Cat. No. 8196, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 66.

and firm. These pieces of flint or similar ones are always found associated with the engravings. The surface having been prepared, the objects to be represented are outlined, probably, by marks with the graver, cutting away the substance to a greater or less depth, according to the sketch desired. The knives, flakes, and gravers may have

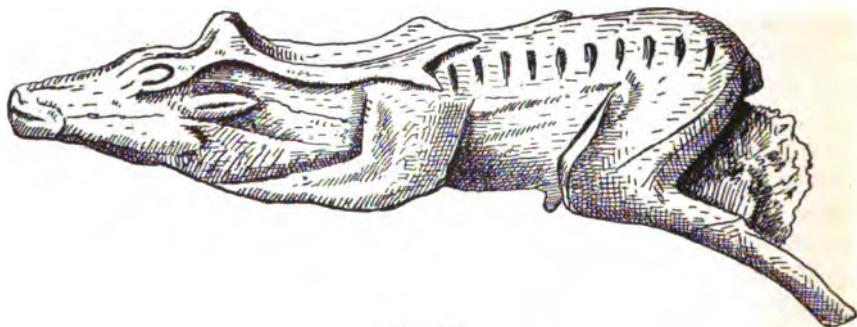


Fig. 67.

SCULPTURED REINDEER IN IVORY; HANDLE OF A PONIARD WITH BLADE BROKEN AND LOST. THE NOSE IS THROWN UP AND THE HORNS LAID ON THE BACK.

Cavern of Bruniquel (Tarn-et-Garonne).

Collected by Peccedeau de l'Isle and sold by him to the British Museum. Cast, Cat. No. 8146, U.S.N.M. Natural size.

been inserted in handles or operated directly by hand. No evidence has been found of the actual employment of a handle. The scrapers are more likely to have been so used, for the same implement inserted in a handle has been employed in modern times by the Eskimo.

In the sculptures the surface, after having been reduced to proper

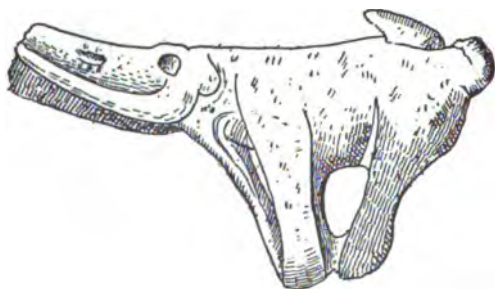


Fig. 68.

MAMMOTH SCULPTURED ON PALM OF REINDEER HORN. HANDLE OF PONIARD, WITH BLADE BROKEN.

Bruniquel (Tarn-et-Garonne).

Peccedeau de l'Isle. British Museum. Cast, Cat. No. 8174, U.S.N.M. $\frac{1}{2}$ natural size.

form, seems to have been polished by rubbing, and accordingly there is found just such an implement as would perform this service, and no other service than this has ever been suggested to account for the existence of the implement. It is a piece of flint, called in French *retouchoir*,¹ rudely chipped into the general form of a man's forefinger. The extreme point of the finger is smooth and polished, evi-

dently the result of much rubbing, and apparently not done by grinding.

Of course this description and the assignment of these utensils is more or less theoretical, but it is not open to the objection of many of the theories propounded by wise men of our day, for—

(1) The existence of these objects is certain.

¹ De Mortillet, *Musée Préhistorique*, plate XLV, figs. 411-417.

(2) They were made by the man of the Paleolithic period.

(3) With these tools and implements it is quite possible to do the art work ascribed to that period.

(4) With the engraving implements and tools herein described are found other objects made by man, and all these are associated in sufficient numbers to establish their common use.

From these facts the conclusion is drawn that the work was done with these implements.

MATERIAL.

Stone, ivory, bone, horn, wood.—There are several engravings and sculptures in stone, but they are comparatively few. The fragments of two such were found at the station of Solutré, but it is not well determined what animals they were intended to represent. The great cave bear on a waterworn schist or schistose pebble, found at the Grotto of Massat; a horse found at Les Eyzies by Lartet and Christy; and the sketches on slate of five reindeer from La Madelaine; with some small examples from the Grotto of Chaffaud, are the principal examples of the use of stone.

Ivory was employed principally for sculpture, as witness the discoveries of Judge Piette at Brassemponty and Mas d'Azil just described (pp. 374 and 400), though the representation of the mammoth on his own tusk, found by Lartet at La Madelaine, was an engraving. The teeth of animals were also employed. The canines of the bear have been found with a seal engraved in feeble relief.

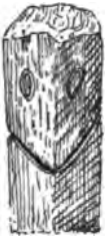


Fig. 70.

HUMAN HEAD RUDELY ENGRAVED ON A FRAGMENT OF REINDEER HORN.

Grotto of Rochebortier (Charante).

Found by Abbé Bourgeois. Museum of School of Anthropology, Paris. $\frac{1}{2}$ natural size.

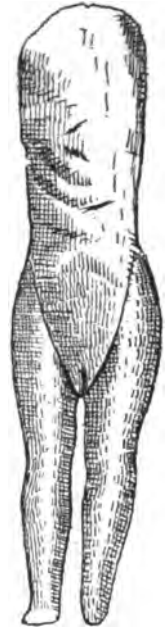


Fig. 69.

IVORY SCULPTURE REPRESENTING A WOMAN (HEADLESS).

Laugerie Basse. Collection, Marquis Vibraye.

Shoulder blades and ribs were often utilized. Deer horns frequently served, but the material does not seem to have been altogether satisfactory to the prehistoric artist. The reindeer horn answered better. It was smooth, hard, homogeneous, tough without being fibrous, and would cut or scratch in any direction. It furnishes about three-fourths of the specimens of the art work of the period.

Wood may have been employed for art work, but of this we have little or no proof. Reasoning by analogy, we may conclude that it was so used. It was easier to work than was bone or horn, and would serve equally as well for many objects. The objection that no such specimens of wood have been found is offset by the answer that they may have all decayed.

PAINTING.

While the art products of Paleolithic man ran principally to sculpture and engraving, there is evidence of his acquaintance with and practice of the art of painting. Color has been used in decoration by prehistoric man.

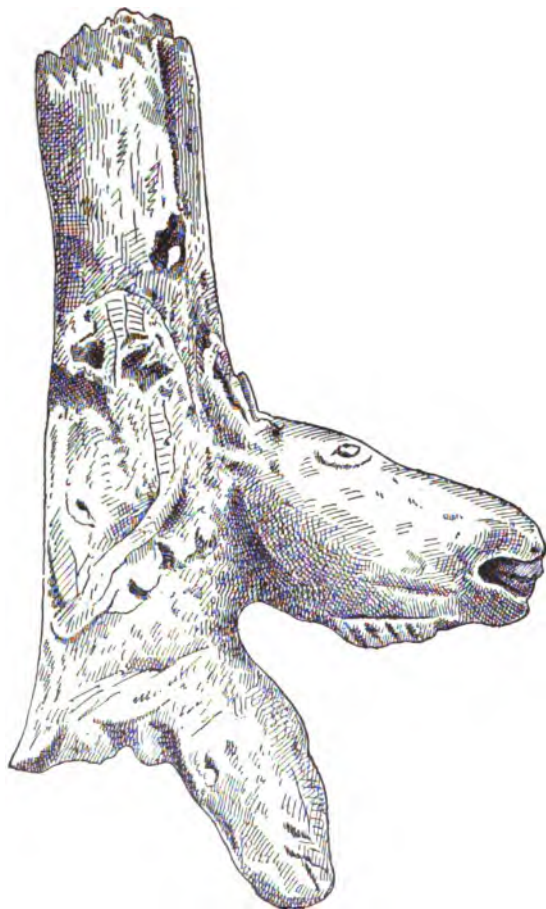


Fig. 71.

HORSES' HEADS SCULPTURED FROM REINDEER HORN.

Grotto Mas d'Azil (Ariege).

Collection, Piette.

Judge Piette made extensive excavations in the Grotto Mas d'Azil (Ariege), France, and reported interesting discoveries relating to prehistoric art in the direction of painting. He assigned this art to a time near the close of the reindeer epoch of the Paleolithic period, to which he gave the name *Asylienne*. The characteristics specially noticeable in the present connection were the hundreds of waterworn pebbles, flat, oval, with rounded edges, resembling in size the net sinkers of eastern United States, which had been painted or colored in different figures. A series was exhibited by Judge Piette at the Paris Exposition, 1889, where the author had good opportunity for their inspection. Judging from

their appearance and material, the pebbles had been gathered in the bed of the stream Arise, which flows through the Grotto Mas d'Azil. They were of quartz, quartzite, and schist, and run from white to gray. They were artificially colored with iron peroxide, still found in the cavern. It was ground and kept in shells (*Pecten jacobæus*) and in cup stones, specimens of which were found with the paint still in them, and was served with spatulas of bone. The color was red or reddish, rather maroon, about the color of iron rust. The figures consisted of dots



Fig. 73



Fig. 74.



Fig. 72.



Fig. 76.

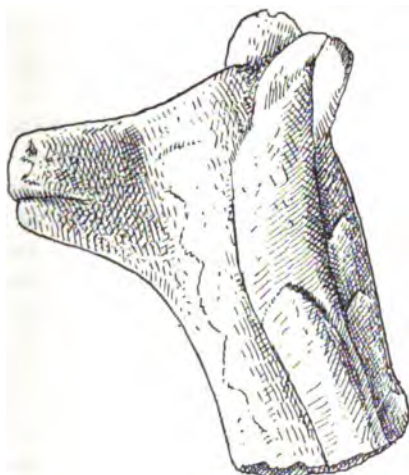


Fig. 75.



Fig. 77

Figs. 72-77.

VARIOUS SPECIMENS OF PALEOLITHIC SCULPTURE FROM DIVERS CAVERNS OF THE PERIOD IN CENTRAL AND SOUTHERN FRANCE, NOT REQUIRING SEPARATE DESCRIPTION.

Cast, Cat. Nos. 99860, 99856, U.S.N.M. All natural size.

from one-fourth to one-half or five-eighths inch in diameter, placed in rows on the flat sides of the pebbles, from one to eight on each pebble; of bars or parallel bands of the same character; of zigzags, crosses, some circles with central dot, and others of similar designs in great number. The painting can best be described by supposing much of the work to have been done by light touches of the finger. It was Judge Piette's theory that these marks and signs had some meaning. They might have formed a numerical system. Still others may have been alphabetic or ideographic signs, still others symbolic. These pebbles were found in a particular stratum of the grotto. They were not placed in any order, but were scattered throughout the stratum. The meaning of the painted designs on these pebbles has never been decided and probably never can be; but in our present state of knowledge they represent man's earliest use of color for purposes of decoration; and, consequently, were the very beginning of the art of painting.¹ They may be more than this, but of this much we may feel certain, that whatever was intended by their makers, whether they were for ornamentation only, "art for art's sake," or had some special significance as numbers, signs, symbols, etc., they were surely an appeal to the color-sense through the eye, and so represent the very beginning of the painter's art. They were an advance upon the glyptic art which had theretofore prevailed, and had thus far been the only artistic manifestation by man.

For description of the excavation of Mas d'Azil see "Etudes d'Ethnographie Préhistorique," by Judge E. Piette,² and for illustration of the colored pebbles see supplement to same paper.³

The employment of colors in the execution of savage art can be traced to a considerable antiquity; and their use, though continued into modern times, does not at all depend upon the intervention of civilized man.

The original mineral colors were probably the red and yellow ochers, red and yellow iron oxides, black from charcoal, and white from chalk and lime; but vegetable colors were not difficult to obtain from leaves, fruits, roots, stems, and seeds; for the extraction and use of these pigments and colors in the various savage decorations and adornment was not above the most primitive conceptions. While there is no trace of the use of colors in Paleolithic times in Europe until the late discovery of Judge Piette, and but little in Neolithic times of that country, yet the employment of colors by prehistoric peoples of other countries was extensive and effective. Beyond this, it displayed considerable power and was withal difficult of execution.

The use of an extensive scale or palette of colors by our North

¹ The coloring of human bones preparatory for secondary burial is not forgotten; but it was ceremonial or religious and not decorative; besides it was later.

² L'Anthropologie, VI, 1896, pp. 274-292.

³ In quarto, 25 plates, chromolithograph.

American Indians is well known. The works of Col. Garriek Mallery on "Picture writing of the American Indians," of Dr. Washington Matthews on the Navajos, of Dr. W. J. Hoffman, Dr. J. W. Fewkes, Mr. F. H. Cushing, Col. J. J. and Mrs. Stevenson, and others, are filled with illustrations of the use of color by these savages. One has only to call to mind the descriptions and representations of the early travelers, or the pictures of Catlin, whose "Gallery of Indian portraits" is in the National Museum¹ to recognize the fact. These instances, while perhaps all historic, are representative of culture beginning before the advent of the white man.

The Peruvians and the Mexicans were adepts in placing the colors upon their cloths. The colors were so well fixed that they were not even modified by the decomposition of the dead bodies, and the wrappings of mummies buried centuries ago retain their primitive colors, even when the original fabric is decayed to shreds.

The Mexicans probably obtained the remarkably brilliant coloring of their pictographs by somewhat analogous processes. These pictographs in manuscript, of which only a small number have reached us, embrace the history of the country, its national traditions, the genealogies of its kings and nobles, the rolls of provincial tributes, the laws, the calendar, religious festivals, and the education of the children—a complete summary, in fact, of all that concerns the manners, customs, and life of the people. They were painted in various colors on cotton cloth, on prepared skin, or on a strong and tough paper made from the fibers of the agave. At times the artist depicts scenes from real life. At other times he records facts by means of hieroglyphic, symbolic, or other characters—conventional signs that have been handed down for generations, and on which innovation is prohibited. Another series of pictures illustrates the education of children, their food and punishments. The father teaches his son to carry burdens, to steer a canoe, or to manage the fishing tackle. The mother instructs her daughter in domestic duties; she sweeps the house, prepares tortillas, and weaves cloths. These pictures present the distinct outlines and bright colors which the Americans sought most of all. Evidently we must not ask them for models of decorative painting. Their complete ignorance of proportions and the laws of perspective demonstrates that their art was the exclusive product of their own genius or of the instinct of their race, and that they had not been subject to any foreign influence.

The region of *piedras pintadas* (painted stones) in South America extends from Guiana to Patagonia. They are found in the wilds of Brazil and La Plata as well as in the more civilized districts of Peru and Chili, and they betray everywhere a remarkable analogy. In the solitudes of Pará and Piauhý, Brazil, are numerous intaglio sculptures executed by unknown peoples. They represent animals, birds,

¹Report of the U. S. National Museum, 1885.

and men in various attitudes. Some of the men are tattooed; others wear crowns of feathers; and the picture is finished with arabesques and scrolls. At La Sierra de Onça are drawings in red ocher, isolated and in groups, without apparent order; and the rocks of the province of Ceará and those of Tejuco are covered with tracings not unlike those on the rocks of Scandinavia. Humboldt describes intaglios on the right bank of the Orinoco representing the sun, moon, pumas, crocodiles, and serpents, ill-formed figures defined most frequently by a simple outline and manifesting slight advancement in art.

CHARACTERISTICS OF THE ART OF THE PALEOLITHIC PERIOD.

A few words as to the characteristics of the art of the Paleolithic period. It has been already said there were some geometric designs. These were by lines or dots, and, curiously enough, never or rarely in the form of a cross, triangle, square, or circle, concentric or otherwise. They consisted of parallel lines, sometimes crossed, sometimes drawn in different directions, zigzags, chevrons, and sometimes the double chevron, giving it the appearance of the letter X. On some of the long, straight instruments of bone appear undulating, wavy lines, and in a few cases are round, slightly pointed projections—protuberances like a mamelon.

In all these combinations of figures none have been found which seem to have any meaning or to have the form of any letter, word, or hieroglyph. They do not correspond to any sign, ideographic or hieroglyphic. The cross is not found; there is no representation of sun worship, nor of the sea, nor of any divinity, good or bad. Apparently there had been no thought other than that apparent upon the face of the picture. For instance, when horses are represented following each other we can understand there is a drove. When the mammoth is represented, we understand that the artist has seen the animal. When a man is represented following the bison and in the act of throwing his spear, we can understand that a hunting scene is meant. Beyond these and similar views no ideas seem to have been attempted. But we are to remember the paucity of the sources of our knowledge.

The designs, whether of drawing, engraving, or sculpture, seem to have been original in so far that they were neither copied from other drawings nor adapted from other schools or masters. They do not seem to have been composed pieces, but drawings made direct from nature with the original before the eye of the artist. Those representing the two horses' heads and that representing the hind legs of the reindeer and the naked woman would appear to have been of this kind.

There have been found in western Europe about four hundred specimens of this engraved and sculptured art work belonging to the Paleolithic period. Of these, four-fifths are representations of animals. How many sketches—mere essays or attempts—have been found, the author has no means of knowing. These are on fragments and are not sup-

posed to have had any utility. Of the implements intended for use and thus decorated, the *bâtons de commandement* are in the greatest number; then dagger points of deer and antelope horn, and the handles of poniards. The Musée St. Germain possesses one hundred and sixteen objects of the art of this epoch. Among these are twenty-nine *bâtons de commandement*, twenty-two daggers of antelope or deer horn, and five handles of poniards; total of these specimens fifty-six, or about one-half the entire art collection of that museum. The rest are either objects of unknown use or else sketches not intended for any use.

The United States National Museum possesses one hundred and fifty-six specimens, originals and casts, belonging principally to the Wilson collection.

LOCALITIES.

Be it understood that only those stations or caverns in which art objects have been found can be reported. We can easily believe that there are many wherein they exist but have not yet been discovered.

Industrial objects and implements are found associated with the art objects, and consequently were made by and belonged to the same people, and these are disseminated throughout western Europe in almost every locality occupied by Paleolithic man. These localities extended from the Pyrenees to central England and from the Atlantic Ocean to northeastern Switzerland. Divided according to departments in France, cantons in Switzerland, and shires in England, the distribution, with the names of the principal caverns containing this art work, is as follows:

Beginning with the department of Dordogne, which has furnished about one-third of the number found, the caverns are: La Madelaine, Laugerie Basse, Laugerie Haute, Gorge d'Enfer, les Eyzies, Cornac; Mayenne—Cave Margot; Vienne—Cottes, Chaffaud; Charente—Chaise, Montgaudier, Placard; Tarn-et-Garonne—Bruniquel; Landes—Sôrdes; Haute Pyrenees—Auresan, Lortet; Haute Garonne—Gourdan; Allier—Massat, Vache; Aude—Bize; Gard—Pont du Gard; Haute Savoy—Salève; Schaffhausen, Switzerland—Thayingen; Arrondissement de Dinant, Belgium—Goyet, trou Magrite; Derbyshire, England—Cresswell.

Discoveries of paleolithic art are being continuously made in western Europe, thus demonstrating the correctness of former conclusions and the genuineness of former discoveries as well as the long and extensive human occupation in paleolithic times. Some of those reported since the writing of the foregoing chapter are that of M. Julien of the statuette in steatite of a woman in the caverns of Montone, now in the museum of St. Germain, reported by Solomon Reinach;¹ that of E. Rivière in the grotto of la Mouthe, Commune de Tayac, near Les Eyzies, Dordogne, wherein the art work consisted principally of carvings of animals on

¹L'Anthropologie, 1898, p. 26, plates I, II.

the rocky walls of the cavern¹ associated with objects and evidences of Madelainien art, gravers bone points, etc.; further discoveries of M. Rivière in the celebrated Cavern of Cro-Magnon at Les Eyzies.² There not only former paleolithic objects of industry were continued, but the gravers and engraved bones were found, the most important being a fragment of rib bone with the figure of a female engraved in profile and at full length. Also art works similar to those in the Grotto de la Mouthe found in the cavern of Pair-non-Pair, excavated by F. Daleau (Bourg-sur-Gironde) and F. Regnault.³

SUCCESSION OF ART PERIODS.

The nomenclature of the different art cultures heretofore described belonging to the Paleolithic period in Europe is of small importance compared with the facts of their superposition and succession in point of time and their evolution in art. The fact of progression from an earlier and ruder to a later and higher art culture seems to have been satisfactorily established by investigation of the caverns themselves. The caverns were gradually filled up, either by natural or artificial causes, or by both. By examining the strata in their succession the investigators have demonstrated that there are marked differences in the art and industry between the objects found in the different strata. Of course, the filling up of the caverns must have been in chronologic sequence. Superposition means succession. The distinction between the various epochs in the Paleolithic period or the distinctions between the Paleolithic and Neolithic periods are not to be discussed here. The reader is referred to standard works upon the subject. A list of these is given in the Handbook⁴ and in Primitive Industry.⁵

A few salient facts may be presented showing this superposition and consequent succession, explaining an improvement in art culture from the bottom of the cavern toward its top. For example, at Kent's cavern, near Torquay, England, in the caverns investigated with all possible care during a period of twelve or thirteen years, in which as many thousand dollars were expended, under the direction of a committee appointed by the British Association, the strata of these early occupations were covered by layers of stalagmite spread over what was then the entire surface, separating and sealing it hermetically from subsequent occupation. Under this, in various parts of the cavern, were found specimens of Chelléen chipped-flint implements, and beyond the chips and flakes, possibly the hammers incident to their fabrication, no

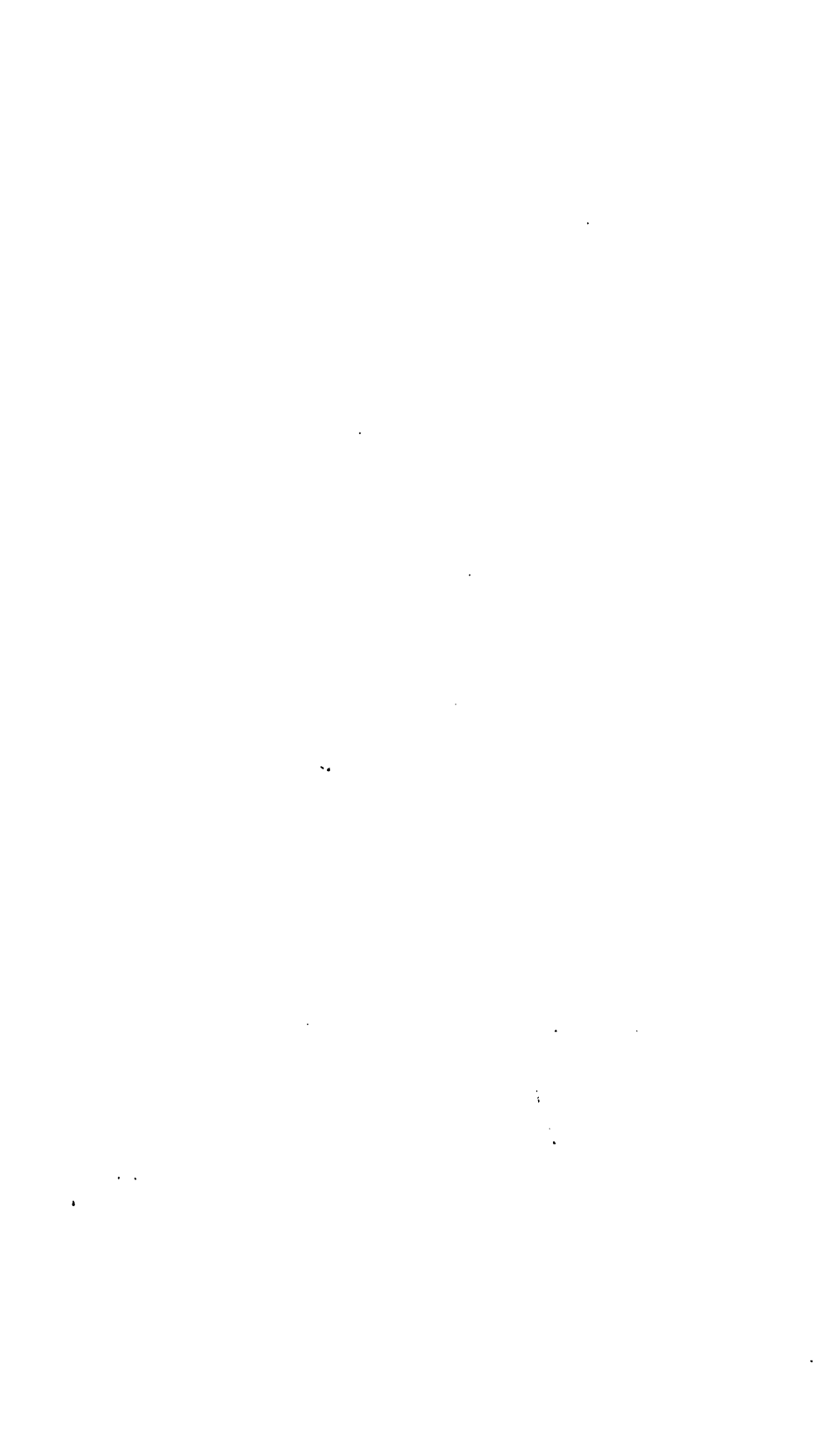
¹Bull. Soc. d'Anthropologie, Paris, July 1, 1897, VIII, pp. 302-329; November 4, pp. 484, 497.

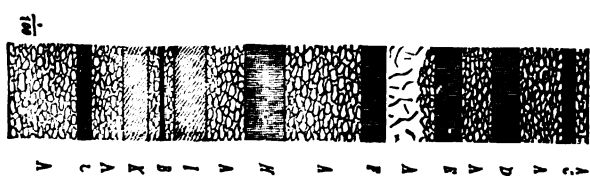
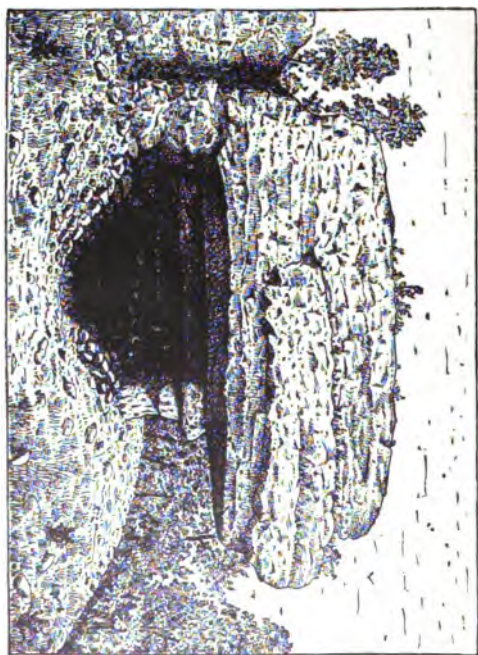
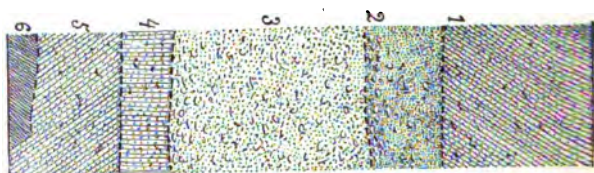
²Nouvelle's recherches anthropologiques et paléontologiques dans la Dordogne (Assn. française pour l'Avancement de la Science, Caen, 1894); Bull. Soc. d'Anthropologie, Paris, November 18, 1897, VIII, pp. 503-7.

³Bull. Soc. d'Anthropologie, Paris, 1897, VIII, p. 315.

⁴Report of the U. S. National Museum, 1887-88, pp. 597-672.

⁵Smithsonian Report, 1892, pp. 522-534.





a. PERSPECTIVE VIEW AND (b) SECTION OF THE CAVERN OF PLACARD (CHARENTE), FRANCE. c. SECTION OF THE PREHISTORIC CAVERN OF SCHWEITZERBILD, SWITZERLAND.
Strata showing superposed successive epochs of culture.

other traces of human industry was found. In the Grotto of Placard in southwestern France (Plate 17), the same superposition was found, which gave satisfactory evidence of this succession of human occupation and of the accompanying changes and improvements of human culture. The strata containing Neolithic and Paleolithic objects are distinctly marked, and are separated by a sterile stratum made up of imported clay, or earth or of broken stones from the roof of the cavern, several, sometimes many, inches in thickness. The cavern of Laugerie Haute gives the same evidence and is even more positive, for the sterile stratum is about 4 feet 3 inches in thickness. In the Grotto de la Vache the stalagmitic stratum between the Paleolithic and Neolithic industries is about 18 inches. The latest indications we have was when M. Boule, of Paris, visited the prehistoric cavern of Schweitzerbild, near Schaffhausen, Switzerland, in the neighborhood of the cavern of Thayingen which furnished the celebrated engraving on bone of the reindeer browsing (fig. 24, p. 381). M. Boule has published a report of his investigations¹ in which he describes the walls of the cavern with their superposed and consequently successive occupations and corresponding improvements in human invention and human culture. (See Plate 17 c.)

Plate 17 (fig. a) shows a perspective of the Grotto of Placard with a section on the right side *b* giving the various strata from bottom to top. The spaces marked *A*, ten in number, show the strata which were barren, and were without any objects or evidences of man's industry or occupation. They were formed of rock which had fallen from the roof to the floor during periods when the cavern was not occupied by man. The other letters represent spaces, the strata of which were the opposite of this, and contained objects representing the various epochs of human culture within the period of occupation. *L* contained Moustérien points; *K*, Solutréen leaf-shaped points; *I*, upper Solutréen, with bone points and those of flint, shouldered (*pointes à crân*); *H*, *F*, *E*, and *D*, contained objects clearly Madelainien, bone points, engraved bones, and even a *bâton de commandement*; *C*, the archæologic stratum nearest the top, contained Neolithic objects, polished stone hatchets, arrow points, fragments of pottery, and bones of modern animals.

The same difference of industry, showing a difference in culture by the stratification in the caverns, occurs in the investigations by Judge Piette in the large number of caverns in southern and southwestern France, and referred to in this paper (p. 374). In fact, this stratification of culture is the foundation of his classification.

At the conclusion of the excavations and investigations by Lartet and Christy, it was the opinion of many prehistoric archæologists that there was a complete solution of the continuity in the human art and industry, as there was in the human occupation of western Europe at the close of the Paleolithic period. This opinion grew in strength until nearly everyone became an adherent of it. It was evident that the

¹ *Nouvelles Archives des Missions*, III, plate III (plate 17, fig. c).

animals which occupied that country during that period materially changed their habitat. The causes of this change have never been completely determined, but it is supposed that climate was the principal one. The fact of the change seems well established. The three species of *Elephas*—the last being the mammoth, the cave bear, cave lion, cave hyena, and several others—became extinct. Others—the musk ox, blue fox, and more than any other, the reindeer—to the number of thirteen species of animals, all cold loving, migrated to the far north and have never since occupied any portion of the territory in western Europe wherein they were so plenteous during this Paleolithic period. Five other species of animals, like the chamois, also cold loving, changed their habitat by migrating to the mountains, thus making a complete change of eighteen animals at the close of that period. What became of man? It was believed, as has been said, that he also migrated or perished. At all events, it has come to be the general belief that the evidences of his presence, by objects of either art or industry, ceased altogether; that there was a hiatus in the occupation of that country by man, which was brought to a close by the migration or entry from the far east, of Neolithic man or man with a Neolithic civilization. The differences between these two art epochs will be treated in the next chapter.

Learned men have speculated considerably concerning the happenings at the close of the Paleolithic period in their relation to man. This was necessarily speculative. It was impossible to procure definite or positive testimony. The only evidence obtainable consisted of the remains of man or of his art or industry, while the chronologic identification of these as subsequent to the Paleolithic period was extremely difficult, if not impossible. One theory is that he migrated to the north, as did the animals which were his contemporaries. The similarity between the art of the Eskimo in carving on ivory and those carvings found in the caverns in southern France and described in this paper has furnished the foundation for this theory. Another theory is that man in western Europe at the close of the Paleolithic period perished. A third theory is that he migrated to the far east, the Orient, assimilated with the peoples there, became a part of the Aryans, and that his art, taking a new lease of life, began its western peregrinations through Mesopotamia, Chaldea, the Caucasus, and culminated in Greece, where it formed another center of culture, and, spreading through Italy in the period of its decadence, it at last reached western Europe, the place of its origin and birth.¹

A fourth theory is that he went—just how is not explained—to the north of Africa. The foundation or authority for this is the supposed resemblance in the anatomical and physical characters between some of the tribes belonging to that country and the Paleolithic man of southern France. The Berbers of Africa and the Guanches of the Canary Islands and the Caribs of still other islands in the same

¹Solomon Reinach, *La Sculpture en Europe*; *l'Anthropologie*, V, pp. 19-21.



GROUP OF ARTISTS OF THE CHELLÉEN PERIOD ENGAGED IN CHIPPING FLINT IMPLEMENTS.



FAMILY OF THE MADELAINIEN EPOCH, WITH REPRESENTATION OF THE ROCK SHELTER OF LAUGERIE BASSE.

From groups at Paris Exposition, 1889.

latitude or direction are said to be of the same stock as the cave dwellers of France.

But these are archæological or anthropological questions, only incidentally affecting art, and therefore need no further argument or citation of authority.

THE ASPECT OF MAN OF THE PALEOLITHIC PERIOD.

Of course no man of any of the epochs of the Paleolithic period has ever been seen, and therefore he is not described by any person of modern or historic times. No history, however ancient, will contain any representation of him. Egyptian, Chaldean, and other Oriental civilizations may contain sculptured representations of man of high antiquity, and possibly one can not say that these were not individuals of prehistoric ages, but no one can say, with any certainty, that they are. Any attempt to reproduce or represent the cave man must be largely theoretical. We have some of his skulls and long bones. We have his pictorial representations as shown by the engravings of that time and figured in this paper (fig. 36). It is said by those anthropologists who have investigated the subject most profoundly, that the Berbers of northern Africa and the Caribs of the islands in the Atlantic Ocean most nearly correspond with the man of Paleolithic times. They judge this by comparison of the anatomy and from a consideration of the evidence. With this for a foundation, the anthropologists of the Paris Exposition of 1889 reproduced groups of the people of the Paleolithic period, which were installed on the foyer of Anthropological Hall. Plate 18 represents two of these groups. Fig. 1 is a man and a woman of the Chelléen epoch, represented in the act of chipping flint nodules and making the implements belonging to their epoch, such as are shown in figs. 1 to 9. Fig. 2 of plate 18 is a reproduction of the cavern of Laugerie Basse, representing a man standing, just returned from the chase; while seated opposite him are two women, presumably his wives, engaged in engraving the bones of the cavern, some of which have possibly been shown in this paper.

Whether the statuettes found by Judge Piette and forming part of his collection were actual representations of the peoples who made them or who inhabited the localities is not determined. Piette is of opinion that they were, and that the specimens represented two groups or races of people,—one fat and heavy, the other thin and light.

CONCLUSIONS.

Sundry modern authors have enunciated various theories of art, based upon the psychologic proposition of the parallelism of human thought and the similarity of human needs. With this and the assumption of a permanence of the relations of man to his environment for a foundation, they have formed the conclusion that peoples or tribes in a given stage of culture adopt similar arts and indeed a general

technologic similarity. They assert the foregoing rule to be a natural law and applicable to widely separated peoples, and not at all depending upon any communication or correspondence between them. Others applying this theory of similarity of human thought to the evolution of art, principally of ornament, seek to explain every design or pattern, whether historic or prehistoric, savage or civilized, ancient or modern, by declaring that they originally had some occult meaning and that they represented some idea (to us unknown) of the aborigines who invented them. It is declared that if the psychological, including the anthropological, student of the present day could follow these aboriginal designs back to their origin they would find them based on this occult, unknown meaning. Some of these authors, elucidating this proposition, investigate the ornaments of savage or primitive peoples, and seek to demonstrate this occult and unknown thing to have been the origin of all ornament and design. They argue that by the various processes of evolution, the design changing as the idea changed, gradually, step by step, the idea is lost, and nothing remains to represent it but the present unmeaning ornament.

The author, deprecating the tendency to lay down general rules, concedes the possibility of this genesis of ornament in some cases, but declines to accept it as one of the rules. He believes his illustrations of the earliest designs made by man, their great numbers, and their evidently original invention and adoption as ornaments show that the foregoing genesis of ornament is not the rule, whatever its application in particular cases. He denies the correctness of the general proposition of Professor Haddon, especially in its applicability to prehistoric art, "that those who write in the future on decorative art will have to prove that any pattern or design is a purely arbitrary form. That assumption is no longer permissible."¹

It is always said by the reformers in the psychology of art that their position could be sustained if we could only get back to the beginning of the ornament or to the origin of the art. In the present chapter the author has presented the very beginnings of art. No art can, either in point of time or of civilization, be earlier than that here given. The specimens, in their relation to time, date to the Glacial epoch, and in point of civilization to the Paleolithic period. Nothing that we know of man, not even his existence, is earlier than the art works set forth herein. There was no other beginning to art; there is no relation between this and any preceding period, for so far as relates to art and ornament there was no preceding period. Art begun here; these specimens show the natural or original germ of art in the human mind uninfluenced by anything beyond the necessary environment of life and the inevitable conditions of existence.

So far as can be known, the impulse which moved man in this art

¹ A. C. Haddon: *Evolution in Art as Illustrated by the Life Histories of Designs*, p. 164.

work was his love of beauty and his desire to gratify it. This love was purely æsthetic and without any utility so far as relates to the engravings on bone, etc., and only partly utilitarian when employed in the beautifying of weapons and implements.

This innate love of ornament has been pushed by some primitive peoples to such extremes as to interfere with the utility of the decorated object, as in the carving of the handles of Mangaian symbolic adzes of the Hervey Islanders; but this belongs to more modern times. We are now dealing with the earlier, the Paleolithic man, with man in the infancy of his race, and we find his ornaments to have been more simple; they had not then run to excess nor interfered with the utility of the decorated object.

These engravings and decorations during the Paleolithic period stand as the foundation or beginning of all art, and we will see how, through the civilization to come after them in the Neolithic and Bronze Ages, these Paleolithic motifs were repeated again and again, how they varied, how they grew, and yet how, down to the end of the prehistoric and the beginning of the historic period, they never got beyond lines or dots, which combined made the parallel lines, the chevron, the herringbone, the zigzag, and similar simple geometric designs. They all grew out of the same beginning and had the same origin. They had no occult meaning; they never stood for any great divinity or power, whether natural or supernatural; they were simply lines and dots arranged in ornamental form to gratify man's innate sense of beauty and because he wished the things he possessed to be beautiful in his eyes.

It is needless to discuss the causes of this natural and innate taste on the part of man. He is born with it, it is part of him, its manifestations afford him pleasure, they gratify his senses, and are to be classed in the same category as the delights of the palate, the beauties of color, and the sweetness of music. He has these tastes, he enjoys their gratification, and he indulges them when he has the opportunity.

Mr. W. J. Stillman, in "Old Rome and the New," says:

The modern conception of the arts of design is that they are intended as the mirror of nature; the ancient and true one is that they were the outcome of emotion, aspiration, and imagination or spiritual conception of the artist.

These observations may find other illustrations throughout this paper. They might have been postponed to another portion, but they come properly in this place, and the author has deemed wise to insert them here at the conclusion of this chapter, that reference may be made to them in the future reading.

While there have been inventions and duplicate inventions of new designs and reinvention of forgotten ones, yet it is the belief of the author that as a rule the perpetuation of ornamental designs was by imitation and teaching, passing from generation to generation, from parent to child, and from master to servant or slave. Decorative art

forms part of human culture and civilization, and its extension and distribution among men was accomplished in much the same manner as Sir John Lubbock says of the geographical distribution of human races, which, curiously enough, coincides with that of other animals. "There can be no doubt," he says, "that he [man] crept over the earth's surface little by little, year by year, just, for instance, as the weeds of Europe are now gradually but surely creeping over the surface of Australia."¹

Out of this erroneous theory of the parallelism of human thought has grown that other equally erroneous declaration of the absolute uniformity in man's thoughts and actions, in his aims and methods while he is in the same degree of development, without regard to the country or epoch in which he lived. And this theory has been pushed until it has been said nothing but geographical environment seems to modify the monotonous sameness of man's creations. The theory may be applicable to certain peoples under certain conditions. But it surely has its limitations and is not applicable to individuals. When stated as a rule it does not take into consideration the will, energy, or reasoning powers of man. It leaves out his egoism and his desire for power, improvement, and happiness, which lie at the very foundation of human civilization. The progress of peoples through consecutive stages of civilization is entirely compatible with the author's theory that knowledge of specific objects, the uses of material things, the performance of certain rites, the playing of certain games, the possession of certain myths and traditions, the carrying on of certain industries, were transmitted from one generation to the next, from father to son, mother to daughter, teacher to pupil, boss to apprentice, master to servant or slave; that the future generations improved or were retarded according to their conditions and surroundings, principally their needs, and their relative intellectual faculties and powers of imitation, and that this knowledge passed from one country to another chiefly by the migration, contact, or communication between their peoples. The knowledge of the same things by separated peoples, within reasonable bounds of similarity, increased by complication of machinery and the difficulty of construction, may be treated as reasonable evidence of such migration, contact, or communication.

II. NEOLITHIC PERIOD.

COMPARED WITH PALEOLITHIC.

The Neolithic period was first discovered in western Europe, although savages in that culture-status in other parts of the world had been known long before. It, along with the Paleolithic period, is classed as part of the Stone age because the principal cutting implements continued to be made of stone. There were radical differences between these

¹ Sir John Lubbock: *Prehistoric Times*, pp. 587-601.

two periods; differences in climate, geography, fauna, domesticity of animals, sociology, industry, and art.

In the later epoch of the Paleolithic period the climate was cold and dry, with extreme temperatures, while in the Neolithic period the climate was temperate and uniform.

In the Paleolithic period were living many great animals, now fossil, like the cave bear, the giant beaver, and, most plentiful of all, the mammoth. In the Neolithic period these and others to the number of seventeen, became extinct. Out of forty-eight well ascertained animal species living in France and England during the Paleolithic period, only thirty-one continued into the Neolithic period. Eighteen species of the animals living in the center of Europe associated with man in the Paleolithic period were cold loving. In the Neolithic period, thirteen of them, such as the reindeer, antelope, musk ox, blue fox, and white bear, emigrated to colder countries by latitude, while five, the chamois, marmot, wild goat, and others, have emigrated to colder countries by altitude, going up the mountains.

In the Paleolithic period there were no domestic animals; in the Neolithic period they were abundant.

In the Paleolithic period the population was nomadic; they were hunters and fishers, but not agriculturists; in the Neolithic period the population was sedentary, and agriculture became well developed.

In the Paleolithic period there was practically no pottery in England or France. There are two localities in Belgium where pottery is alleged to have been found. In the Neolithic period pottery was everywhere made and used.

In the Paleolithic period there were no monuments or burials, apparently no respect for the dead, and therefore no evidence of any belief in a future state.

DIFFERENCES IN ART OF THE TWO PERIODS.

Among these differences the strangest was in the fine arts. In the Paleolithic period we have seen the large number of sculptures and engravings, and that even painting was attempted; how nearly every animal belonging to that epoch, from man down, has been graphically represented in the fine art of that period. On the contrary, in the Neolithic period there are innumerable specimens of decorative art as applied to industry, while we are wholly without graphic delineations of the animals of the period, and no attempt appears to have been made to represent any living thing or to make a representation of nature in any of its forms.

GEOMETRIC ORNAMENT.

The art of this period was entirely decorative, and consisted of marks, lines or dots, usually by incision, in geometric form, such as hatch marks, zigzags, herring bone, chevrons, parallel lines, and thumb marks.

These decorations were principally employed in plastic art, and usually for the decoration of pottery. Graphic representation of this decoration shows it to have been similar to that of the Paleolithic period. Yet the likeness is more apparent than real. In Paleolithic times the decoration was, as we have seen, principally by representations of objects taken from nature. The geometric designs were used, and it was therefore correct to show them. Their omission would have been improper. But they were used on few specimens, and on these but sparingly. Harpoons and points of bone were the principal objects of such decoration. Turning back to plates 13, 14, and 15, we will see by these harpoons and points how slight was the opportunity of the paleolithic artist, and we know in how few instances he embraced it. His decorations consisted principally of short marks arranged in parallels and repeated so as to make a pleasing effect.

Not so, however, in Neolithic times. The designs, still geometric, were more complete, were larger, more extended, had greater continuity, and, as before remarked, were used a thousandfold more than in Paleolithic times.

Plates 19 and 20 contain representations of geometric decoration. They are all from western Europe, were taken from actual specimens, and can be identified with the originals. The most of these undoubtedly belong to the Neolithic age, though some may be related to the Bronze age. This is a matter of no consequence, for the Bronze age was but the continuation of the Neolithic age. They are both believed to have been the same race of people throughout western Europe. Some of these decorations were used indiscriminately during both ages.

FLINT CHIPPING.¹

This art was begun in the Paleolithic and continued throughout the Neolithic period. The fundamental distinction was that in the Neolithic period, after the preparation of flint implements by chipping or battering and pecking, most of them were finished by the secondary process of grinding, and in many cases, polishing. This distinction between these two periods in the art of flint or stone working has not been appreciated by some of our American anthropologists, and has been the foundation of great errors.

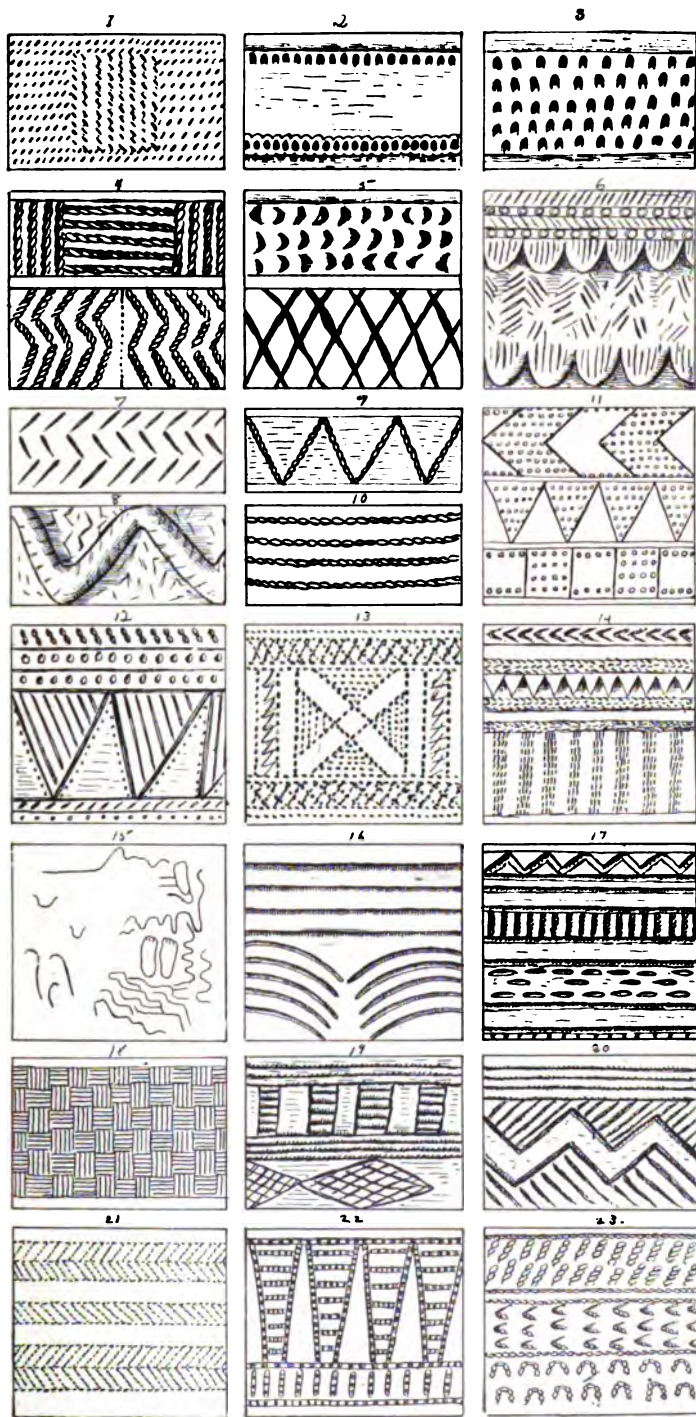
LONG FLAKES¹ OR BLADES AND LIVRES DU BEURRE OF GRAND PRESSIGNY, FRANCE.

Plate 21 represents one of these livres du beurre. By its side is one of the flakes (Cat. No. 136657, U.S.N.M.), side view, and next to it is another flake represented edge view. If this were an archaeological paper instead of being one on fine art, these objects would be fully described, but we are only concerned with the delicate art handiwork of striking off the flakes. This was done with a stone hammer, and

¹ See footnote, p. 355.

EXPLANATION OF PLATE 19.

- Fig. 1. DOTS SLIGHTLY PROLONGED ARRANGED IN HORIZONTAL PARALLELS, WITH PANELS OF THE SAME ARRANGED PERPENDICULARLY.
Greenwell, British Barrows, page 67, fig. 54.
- Fig. 2. ORNAMENTED RIM OF CINERARY URN, PARALLEL LINES IN RELIEF, WITH A SINGLE ROW OF INDENTATIONS FORMING A BEAD OR MOLDING WITH PANEL BETWEEN.
Idem, page 68, fig. 55.
- Fig. 3. THUMB-NAIL DECORATION IN PARALLEL HORIZONTAL LINES.
Idem, page 69, fig. 56.
- Fig. 4. ORNAMENTATION BY LINES OF TWISTED CORD ARRANGED IN PARALLELS ALTERNATELY HORIZONTAL AND VERTICAL.
Idem, page 70, fig. 57.
- Fig. 5. LARGE INDENTATIONS, CRESCENTS, MADE WITH THE THUMB NAIL.
Idem, page 71, fig. 58.
- Fig. 6. RIM DECORATION OF ALTERNATE BANDS OF DOTS AND INCISED LINES, WITH SCALLOPS IN HIGH RELIEF.
Idem, page 73, fig. 60.
- Fig. 7. ZIGZAG OR HERRING-BONE DECORATION, ROWS OF PARALLEL INCISED LINES.
Idem, page 74, fig. 61.
- Fig. 8. ORNAMENTED BAND FOR RIM OF VESSEL, ROLLED IN HIGH RELIEF, ZIGZAG BETWEEN TWO MOLDINGS.
Idem, page 72, fig. 59.
- Fig. 9. ZIGZAG OR DOGTUOTH DECORATION, IMPRINT OF CORD.
Idem, page 75, fig. 62.
- Fig. 10. IMPRINT OF CORD IN HORIZONTAL PARALLEL LINES.
Idem, page 75, figs. 62, 63, 64.
- Fig. 11. LINES OF DOTS IN HORIZONTAL PARALLELS DIVIDED INTO CHEVRON, DOGTUOTH, AND SQUARE FORMS.
Idem, page 76, fig. 65.
- Fig. 12. DECORATION OF RIM OF BOWL BY DOTS AND MARKS, IN PARALLEL LINES WITH DOGTUOTH OR VANDYKE POINTS FORMED OF INCISED LINES PARALLEL TO EACH OTHER AND TO THE SIDES OF THE TRIANGLE.
Idem, page 86, fig. 71.
- Fig. 13. LINES MADE BY DOTS WITH BONE POINT OR HARD WOOD, IN HORIZONTAL BANDS, DIVIDED BY PERPENDICULAR COLUMNS INTO PANELS FORMING A SQUARE, THE CENTER OF WHICH LEFT VACANT, FORMS A ST. ANDREW'S CROSS.
Dawkins, Early Man in Britain, page 361, fig. 127.
- Fig. 14. COMBINATION OF SMALL HERRING-BONE, DOGTUOTH, AND TWISTED-CORD DECORATION FOR THE RIM, AND PERPENDICULAR LINES OF SHORT INCISIONS IN GROUPS OF FOUR OR FIVE ALTERNATING, COVERING THE BODY OF THE VASE.
Greenwell, British Barrows, page 88, fig. 73.
- Fig. 15. ENGRAVING (INTAGLIO) ON SUPPORT OF DOLMEN OF PETIT-MONT, ARZON (MORBIHAN).
De Mortillet, Musée Préhistorique, fig. 581.
- Fig. 16. FURROWS (INTAGLIO), FOUR OR FIVE TOGETHER IN PARALLEL LINES, SOME HORIZONTAL AND CONTINUOUS AROUND THE VASE, OTHERS IN REVERSED FESTOONS.
Greenwell, British Barrows, page 89, figs. 75, 76.
- Fig. 17. COMBINATION OF LINES, SOME INCISED, OTHERS THE IMPRINT OF A CORD, HORIZONTAL, PERPENDICULAR, AND ZIGZAG. Many combinations.
Idem, page 94, fig. 81.
- Fig. 18. POTTERY STAMPED IN IMITATION OF BASKET WORK.
- Fig. 19. ORNAMENTATION IN COMBINATIONS OF INCISED LINES AND CORD IMPRINTS ARRANGED IN HORIZONTAL PARALLEL ZONES AND IN LOZENGE FORM; A CENTER ZONE BROKEN BY PARALLEL PANELS OR BANDS OF SMOOTH SURFACE.
Greenwell, British Barrows, page 101, fig. 89.
- Fig. 20. SAME SPECIMEN AS FIG. 19, WITH INCISED LINES AND CORD IMPRINT IN HORIZONTAL BANDS AND DOUBLE ZIGZAG, FILLED WITH PARALLEL LINES AT 45 DEGREES.
Idem, page 101, fig. 89.
- Fig. 21. SMALL DOTS IN CONTINUOUS PARALLEL LINES AT AN ANGLE OF 45 DEGREES BOTH WAYS; ARRANGED IN BANDS OR ZONES OF HERRING-BONE PATTERN. A common form of decoration in Brittany. Vase from dolmen of Portivi, Quiberon. Original, Museum of Vaunes.
De Mortillet, Musée Préhistorique, fig. 531.
- Fig. 22. DOTS SLIGHTLY PROLONGED, IN PARALLEL LINES, FORMING REVERSED PYRAMIDS, AND ARRANGED IN BANDS AROUND THE VASE.
Greenwell, British Barrows, page 96, fig. 83.
- Fig. 23. IMPRINTS OF CORD SHOWING ONLY THREE OR FOUR TWISTS, APPLIED IN DIFFERENT FORMS, THE WHOLE ARRANGED IN BANDS AROUND THE VASE.
Idem, page 97, fig. 84.



GEOMETRIC DECORATIVE DESIGNS IN USE IN WESTERN EUROPE DURING THE NEOLITHIC PERIOD, SOME OF WHICH WERE CONTINUED INTO THE BRONZE AGE.

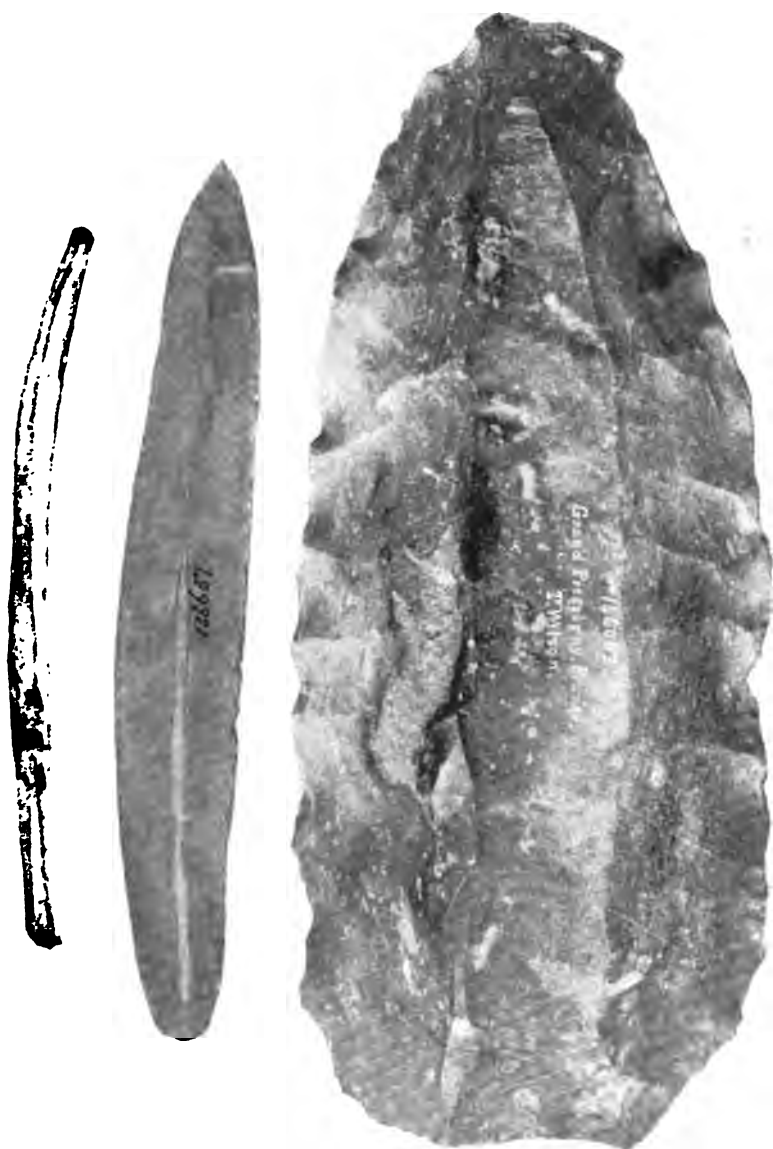


EXPLANATION OF PLATE 20.

- Fig. 1. **CROSSED LINES OF SMALL DOTS, ARRANGED IN BANDS—ONE OF THE COMMON DECORATIONS OF POTTERY IN BRITANNY.** From a fragment found at the Cromlech of the Is. des Tisserands (Morbihan).
(Original in Musée St. Germain.)
- Fig. 2. **SCALLOPS MADE BY THUMB AND FINGER ON RUDE POTTERY AT OR NEAR THE EDGE.**
Lake dwelling of Robenhansen, Zurich, Switzerland. (Musée St. Germain.)
- Fig. 3. **INCISED PERPENDICULAR LINES IN GROUPS OF FIVE OR SIX, INTERSPACED WITH SMALL CHEVRONS.**
Denmark. After Madsen, plate XLIV, page 44, fig. 11.
- Fig. 4. **LINES OF LARGE DOTS ARRANGED IN ZONES, ALTERNATED WITH BANDS OF SMALL DOTS, IN PARALLELS AT 45 DEGREES. A SINGLE BAND, ALSO OF FINE POINTS, ARRANGED IN HORIZONTAL PARALLEL LINES IN DOGTTOOTH OR VANDYKE POINTS.**
Dolmen of Er-Roh Trinité sur-Mer (Morbihan). (Original, Museum of Vannes.)
- Fig. 5. **FINE POINTS ARRANGED IN BANDS OF VANDYKE POINTS, IN PARALLEL LINES AT 45 DEGREES.**
Museum of Vannes. Musée Préhistorique, fig. 536.
- Fig. 5½. **COARSE POTTERY RUDELY ORNAMENTED WITH THUMB-NAIL MARKS ALTERNATED.**
(Musée St. Germain. Musée Préhistorique, fig. 534.)
- Fig. 6. **A DIFFERENT ORNAMENTATION ON THE SAME SPECIMEN AS FIG. 3.**
- Fig. 8. **SMALL POINTS ARRANGED IN BANDS AND ZONES, PARALLEL, SOME OF WHICH ARE IN SINGLE LINES, OTHERS WIDER, WHEREIN THE LINES OF POINTS ARE PARALLEL AT ANGLES OF 45 DEGREES BOTH WAYS. On same specimen as fig. 4.**
- Fig. 9. **LINES OF POINTS CLOSE TOGETHER, HORIZONTAL AND PARALLEL. UNDERNEATH ARE PARALLEL INCISED LINES, IN GROUPS OF SEVEN OR EIGHT, ARRANGED IN FESTOONS, THE PLAIN SURFACE ABOVE REPRESENTING VANDYKE POINTS.**
Monsheim, near Worms. (Museum of Mayence.)
- Fig. 10. **CUP-MARKINGS, SINGLE, PLAIN, SURROUNDED BY A CIRCLE AND CONNECTED BY A LINE. Covering-stone of dolmen, Baker-hill, Ross-shire, Scotland.**
Simpson, *Archæic Sculpturings*, plate xiv, fig. 1.
- Fig. 11. **BANDS OF INCISED LINES, HORIZONTAL AND PARALLEL, THE TWO UPPER ONES PLAIN, AT ANGLE OF 45 DEGREES BOTH WAYS; LOWER BAND OF HORIZONTAL INCISED LINES, VANDYKE POINTS.**
Dolmen de Kerlaval (Morbihan). (Original, Museum of Vannes. Mortillet, Musée Préhistorique, fig. 541.)
- Fig. 12. **WAVED LINES, ZIGZAG, PARALLEL AND IN BANDS. THOSE IN THE MIDDLE ARE BROKEN AT INTERVALS.**
Madsen, *Antiquities of Denmark*, plate XLIII, fig. 2.
- Fig. 15. **MEDIUM DOTS ALTERNATED WITH SMALL BROKEN INCISED LINES. THE LATTER ARRANGED IN HORIZONTAL PARALLELS AT THE TOP AND MIDDLE, INDICATING THE OUTLINE OF DOGTTOOTH ORNAMENT BETWEEN. THESE ARE FILLED WITH MEDIUM DOTS ARRANGED IN HORIZONTAL LINES; A LOWER BAND OF THREE HORIZONTAL PARALLELS OF MEDIUM DOTS.**
(Museum of Zurich. Musée Préhistorique, fig. 538.)
- Fig. 16. **ORNAMENTATION ON SAME SPECIMEN AS FIG. 12.**
- Fig. 17. **SPIRALS AND CONCENTRIC CIRCLES CUT (INTAGLIO) ON A SLAB OF SANDSTONE.**
Eday, Orkney, Scotland. (Original, Museum of Society of Antiquities, Edinburgh. Simpson, *Archæic Sculpturings*, plate xix, fig. 4.)
- Fig. 18. **CONCENTRIC CIRCLES IN PAIRS WITH INTERFERING AND JOINING LINES.**
Dolmen d'Avalles-sur-Chizé (Deux-Sevres). (Original in Museum of Niort. De Mortillet, Musée Préhistorique, fig. 542.)
- Fig. 19. **VANDYKE POINT, DOUBLE, ARRANGED IN PERPENDICULAR PARALLEL LINES WITH INTERMEDIATE SPACES.**
Dolmen, Island of Møn. (Madsen, *Antiquities of Denmark*, plate xvi, fig. 5.)
- Fig. 21. **ORNAMENTATION OF MANY STYLES, REDUCED THIRTY-THREE TIMES, ENGRAVED ON ONE OF THE SUPPORTS OF THE DOLMEN OF GAVR INIS.**
(Mortillet, Musée Préhistorique, fig. 580.)
- Fig. 23. **DOTS AND CIRCLES ARRANGED IN PARALLEL LINES SURROUNDED BY INCISED LINES AND ALL INCLOSED SO AS TO FORM A CARTOUCHE.**
Support of the dolmen of Pierres-Plates, Lochmariaquer (Morbihan).



GEOMETRIC DECORATIVE DESIGNS IN USE IN WESTERN EUROPE DURING THE NEOLITHIC PERIOD, SOME OF WHICH WERE CONTINUED INTO THE BRONZE AGE.



NUCLEUS OR CORE OF BEESWAX FLINT.

Flake, side and edge views. Grand Pressigny, France.

Cat. Nos. 139057, 140002, U.S.N.M. $\frac{2}{3}$ natural size.



NUCLEUS AND FLAKE OF BEESWAX FLINT.

Grand Pressigny, France.

Cat. Nos. 99880, 136651, U.S.N.M. † natural size.

its successful operation required a manual dexterity obtainable only by long practice. It is sufficiently difficult of performance to be ranked among the finer arts. After the preparation of the nodules of flint, so that the blade can be made a sufficient length, with edges smooth and sharp, the upper or top part of the core is struck with the stone hammer (figs. 78*a* and 78*b*) so exact and precise as to the proper point and so delicately gauged as to force, that a single blow knocks off the blade its entire length. There can be no second trial; it is success or failure at the first stroke. Plate 22 represents another of these cores and flakes. The United States National Museum possesses many more of the same kind from the same locality. Anyone who doubts flint chipping being a fine art has but to attempt the operation. He will soon discover that it requires a degree of knowledge and manual dexterity which can be obtained only after many trials. In this it can be favor-

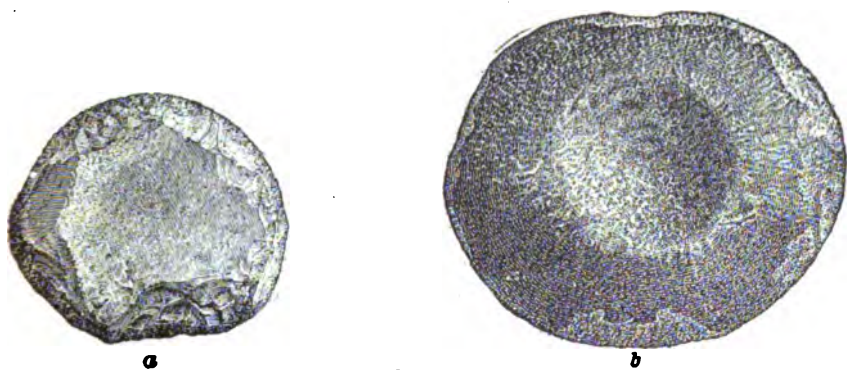


Fig. 78.

HAMMERSTONES.

- (a) White jaspery flint, Ohio.
Cat. No. 17311, U.S.N.M. $\frac{1}{2}$ natural size.
(b) Quartzite, pitted, New York.
Cat. No. 6602, U.S.N.M. $\frac{1}{2}$ natural size.

ably compared to the art of handling the pencil in drawing, the brush in painting, or the chisel in sculpture. It requires even a higher degree of manipulation than either of these. It involves a combination of intellectual understanding derived from a teacher, and a manual dexterity of the hand obtained only by long practice.

The Paleolithic period showed the origin, the very beginning, of art so far as can be determined from our present knowledge of man. The different manifestations of art in the succeeding, the Neolithic, period opens anew the discussion of its origin. A hiatus has been declared between the culture of the two periods, and the differences just described are supposed to represent the renaissance of art in the Neolithic period. Western Europe may have been the cradle of art for the world. The fine art of the Paleolithic period originated there. In the passage to the Neolithic period some branches died out or were lost; new ones were employed, whether invented or

imported is not determined; but certain ones, such as flint chipping and geometric decoration, and possibly others, were continued into the Neolithic period. These latter arts, though forming the principal motifs of the later period, did not originate in it, but in the earlier period, and are to be credited to it.

The advanced culture of the Neolithic period was not indigenous to western Europe. It must have been imported from some country farther east, whence the Neolithic people immigrated when they settled in western Europe. That unknown country may or may not have had earlier relations with Paleolithic culture (for we know that both civilizations spread over that portion of the globe) and in that country the Paleolithic peoples may have taught the Neolithic. But of this we know nothing except what is obtained from the cultural objects themselves, found in western Europe. The art of flint chipping, for example, appears to have been continued from the earlier to the later period without any hiatus, and this could have been done only by teaching, which involves contact and communication between the two ages. This contact in western Europe is denied by most prehistoric anthropologists and the theory of a hiatus between the periods in western Europe is generally accepted, though it has been much weakened. Either the theory of a hiatus must be given up or we must admit contact between the two ages in that unknown Eastern country prior to the migration of the Neolithic peoples to the West. It is easier to believe contact between the two peoples at an earlier period than to believe in a second origin of culture. While certain portions of the cultures of the two peoples have such similarity as to show contact between them, certain other portions have such dissimilarity as to show that the contact was not complete or the communication not perfect. With all the dissimilarities in their culture, it is difficult to believe that the Paleolithic man in western Europe carried away all knowledge of the art of flint chipping or that it was lost (to western Europe) during the hiatus, and that the Neolithic man, on his occupation of that country by migration, reinvented or rediscovered it. The author prefers to believe, as the most reasonable hypothesis, that there had been in some way, unknown though it be, such contact and communication between the two peoples, either before or after their migration, as enabled the later people to learn from the earlier some of their difficult arts, such as the chipping of flint, the making of spearheads, harpoons, and scrapers.

How they came to produce the art of their period is remitted to the same study of psychology required to determine why the man in Paleolithic times should have invented any of the arts. That, we have seen, was because the art objects pleased him. This desire for pleasure was part of the common heritage of mankind, the realization of man's ideal, which we call his good taste. This good taste is involuntary, explainable only by psychology and on a par with the question why does the child like sweets, or why does one child like sweets and another like

sours, or one like music and another not, or like painting, or sculpture, or riches, or science, or literature, or mathematics, or law, theology, medicine, banking, business, war, etc. All we know is that on these subjects (and many others) mankind has an ideal which for the time creates his standard and forms his taste; in time man, through study and contemplation, finds his old ideal fall short of his expectations and he becomes dissatisfied with it; by study and contemplation he conjures a new ideal; a new ideal in art establishes a new standard of taste, and by this he tests his new effort. The argument of condition or environment usually applicable to man's industry and sociology has slight application to his art. His art is for his pleasure, not for his necessity; therefore, the foregoing statement relates only to art objects and not to those of utility. The evolution of utilitarian objects as distinguished from art objects is governed by man's needs, but he has no need, or but little need, for art objects. They are solely for his pleasure, and their evolution or change is only to gratify his changed ideal or standard of taste.

The primary and principal implement required for this art work is the hammer (fig. 78 *a, b*), by which the blow is struck and the flake or chip knocked off. Rude pieces of hard stone, usually flint, quartz, or quartzite, were used for hammers, their sharp corners serving to increase the precision of the blow. When their corners were worn away so that an accurate blow could not be given they were doubtless cast away or used for other purposes. Practically there is no difference between the stone hammers of different countries in the two ages of Stone.

The successful manipulation of the operation of flint chipping as performed by prehistoric man entitles it to be classed among the fine arts, and requires a few sentences of description. As to material, flint best answers the requirements. It should be homogeneous in substance and crystalline or cryptocrystalline in formation. When properly treated it can be struck off into long flakes or blades, producing a keen, smooth edge much the same as slivers of broken glass. The nodules of flint having been prepared, the art of the operation consists in judging the force of the blow and determining accurately the point of impact; then follows the successful manipulation in carrying out this good judgment. In justification of the claim that this is fine art it can be said that no historic or modern individual has ever attained the success acquired by the artist of prehistoric times.

During the progress of this paper the author has received letters from different parts of the United States giving currency to the report that it was the belief of scientists that the art of flint chipping was a lost art, and that the Smithsonian Institution had offered a reward or bonus to anyone who should make the discovery of how it was done. This report is entirely without foundation. The art of flint chipping, so far as it applies to the small flint or glass arrowheads, or the chipping of these materials, is well known and is or has been practiced by

many persons in the United States. A gentleman from Connecticut has sent us a series of small glass arrowheads made by himself. A clergyman from Oregon makes of the mottled jasper-like obsidian beautiful specimens of small arrowheads called jewel points, mounted and sold for use as pins for personal decoration. He makes no pretense of secrecy nor that they are other than his own manufacture, and he sells them as specimens of his art.

Several persons in various parts of the United States, whose names as well as their work are well known, either make new or alter old or broken arrowheads, and they have been known to sell them as genuine. Thus doctored they belong to the class of arrowheads denominated Division IV, Class I. These have been figured and described by the

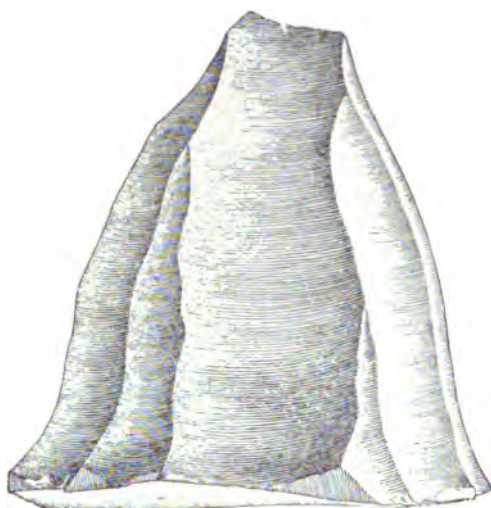


Fig. 79.

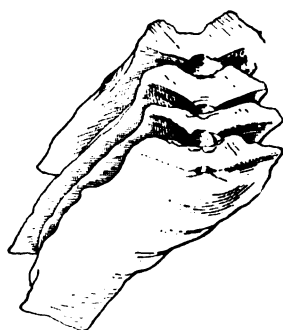


Fig. 80.

Figs. 79 and 80.

CORE OF BLACK FLINT AND FLAKES STRICKEN FROM THE SAME.

Brandon, England.

Cat. No. 139192, U.S.N.M. $\frac{2}{3}$ natural size.

author¹ and the public warned against them, which warning seems to have been acted upon by both makers and purchasers, and the industry in that part of the country has practically died out. It is continued in Oregon.

But this industry is confined to comparatively small arrowheads. The large leaf-shaped implements and similar objects made by chipping, which are thin in comparison to their width, made by striking off fine and long flakes reaching to or beyond the center of the implement, leaving the edges keen and sharp, have never been reproduced. Such implements as are represented in figs. 86 to 95, from the United States, and the large ones in plates 9 and 10, from Europe, have never been made in modern times or by modern workmen.

¹ American Naturalist, XXII, p. 555, June, 1888.

BRANDON CORE.

Fig. 79 represents a core of flint from Brandon, England. The flakes (fig. 80) have been struck off, one after the other, going around the outer edge, gauging the proper thickness for the flake, the inside of one forming the outside of the next. With patience one can rearrange the flakes one by one against the core in the inverse order in which they have been struck off until the nodule is reconstructed. The core shows the conchoidal fracture made by each blow, and with the aid of this peculiarity the flakes can be fitted one to the other, as shown in fig. 80. The same operation is performed in making the cores and flakes of obsidian, to be shown further on (Plate 26).

Conchoidal fracture.—The conchoidal fracture is the evidence of a blow. Every blow which produces a fracture in the flint leaves such a conchoidal figure. By it the early discoveries of the existence of prehistoric man were made, and human inter-

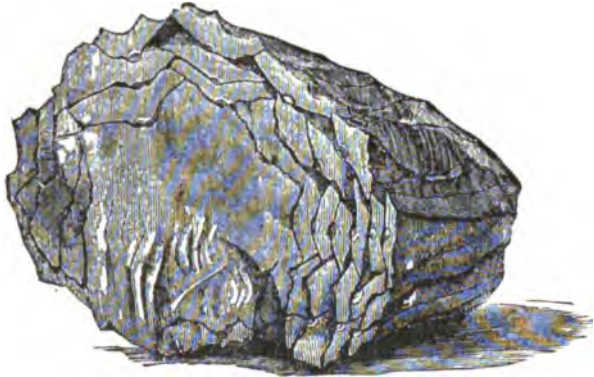


Fig. 81.

CORE OF BLACK FLINT, WITH ITS BLADES AS STRUCK OFF ARRANGED IN PLACE.

Evans, *Ancient Stone Implements of Great Britain*, fig. 2.

vention in manufactured objects rendered certain. Fig. 81 represents one of these Brandon flint cores with its flakes all in place, showing how they were struck off, one after the other.

Most of the works on prehistoric archaeology relating to the making of arrowheads refer to such stone chipping among modern savages, and many of them contain descriptions by travelers and visitors of the different tools and methods by which flint chipping was done.¹ As we are dealing with prehistoric fine art rather than prehistoric archaeology or primitive industry, we need not further pursue the subject of how to chip flint.

BONE FLAKERS.

While stone hammers similar to fig. 78 were, as already mentioned, the principal tool with which flint chipping was done, yet other implements were used. The Eskimo has points of bone or horn called flakers, with which, it is said, he pushes or presses off the smaller flakes.

¹ Sir John Evans, *Ancient Stone Implements of Great Britain*; Wilde's *Catalogue of Antiquities of the Royal Irish Academy*; De Mortillet's *La Préhistorique*; Stephens's *Flint Chips*.

Sir John Evans¹ shows representations of these flakers. Capt. John Smith, writing in 1606 of the Indians of Virginia, says: "His arrowhead he maketh quickly with a little bone, which he ever weareth at his bracer." Sir John Evans² says:

No sculptor ever handled a chisel with greater precision or more carefully measured the weight and effect of every blow than did this ingenious Indian; for even among them arrow making was a distinct profession in which few attained excellence.

SCANDINAVIAN FLINT CHIPPING.

Scandinavia stands at the head of prehistoric European countries for excellence in flint chipping during Neolithic times. The specimens from that country stand as models of such art work.

Daggers.—Plate 23 represents a dagger or poniard of flint from Copenhagen. Its length is $8\frac{3}{4}$ inches, width of blade $2\frac{1}{2}$ inches, and thickness of blade $\frac{1}{2}$ inch. The implement has been made entirely by chipping, the blade in its finishing has been flaked always from the edge, forming a perceptible ridge in the center. The smallness and thinness of the flakes may be imagined from the regularity and smoothness of the edge. Plate 24 represents other specimens of flint from Scandinavia—poniards or daggers. They are of the flint of the country, and the chipping thereof is of the same style and exhibits the same high degree of manual dexterity as the specimen in plate 23. The chipping of the handle of specimen No. 191644, U.S.N.M., is to be noted. It shows how by artistic treatment different effects can be produced.

MEXICO.

Leaf-shaped, Class A.—The Solutrén leaf-shaped implements have already been described and figured (Plate 9). They belong to the Paleolithic period, but the same kind of object, of equally fine art and difficulty of fabrication, was made in the Neolithic period.³ This applies equally to America as to Europe. Plate 25 represents these implements from Mexico. They are of the same general type as the Solutrén leaf-shaped implements which forms Class A of the leaf-shaped division in my "Classification of Arrow and Spear Heads." They are shaped like a laurel leaf, are elliptical and pointed at both ends. Their widest place is one-third or one-fourth the distance from the base. The specimen on plate 25 is from Oaxaca, Mexico, and is $12\frac{1}{2}$ inches in length, $3\frac{3}{4}$ inches in width, and $\frac{3}{4}$ inch in thickness.

THE UNITED STATES OF AMERICA.

Leaf-shaped, Class A.—Plate 26 presents a remarkable specimen of stone chipping. It was found, May 20, 1891, on the farm of and is owned by Mr. G. F. Arvedson, of Carpentersville, Illinois. The material is quartzite, which increases its interest, as quartzite is more

¹ Ancient Stone Implements of Great Britain, p. 35, figs. 9 and 10.

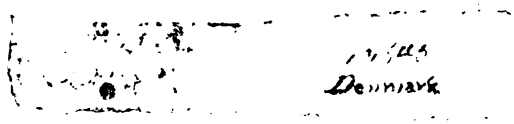
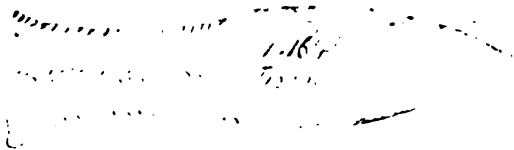
² *Idem*, p. 36.

³ See p. 422.



PONIARD OF FLINT, FINELY CHIPPED.
Scandinavia.

Collection of Rev. Dr. Nevin, Rome. $\frac{1}{2}$ natural size



PONIARDS OR DAGGERS OF FLINT, FINELY CHIPPED.

Scandinavia.

Cat. Nos. 101044-45, 104406, 77, U.S.N.M. † natural size.

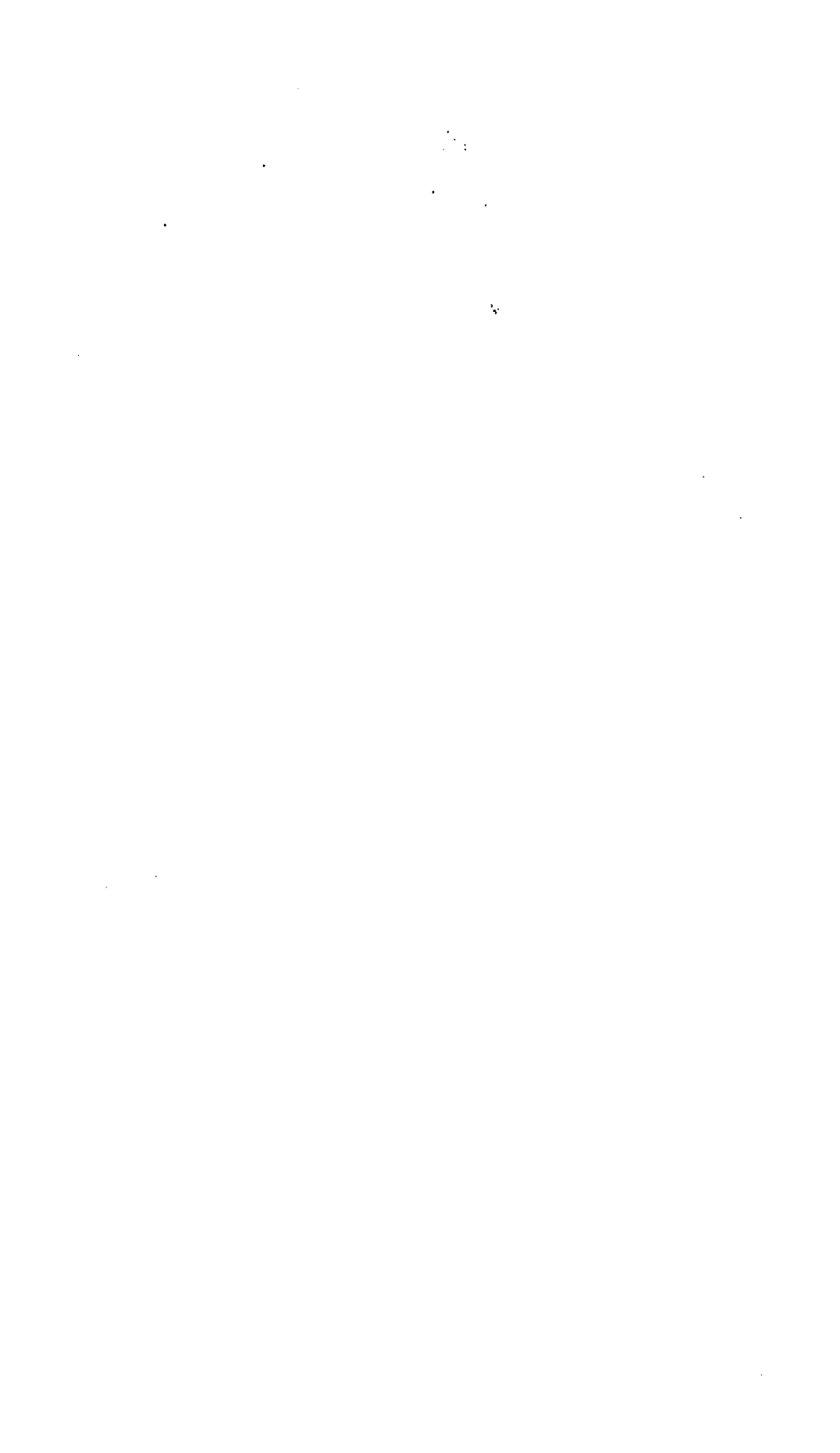




LEAF-SHAPED IMPLEMENT, WHITE FLINT OR CHALCEDONY.

Oaxaca, Mexico.

Douglas collection. $\frac{1}{2}$ natural size.





LARGE QUARTZITE BLADE, FINELY CHIPPED.
Arvedson collection, Carpentersville, Illinois. $\frac{1}{4}$ natural size.



FIVE LARGE SPEARHEADS, CHALCEDONY.
Little Missouri River, Pike County, Arkansas.
Cat. No. 130178, U. S. N. M. (natural size)

refractory and difficult to chip than flint. The remarkable characteristic of this implement is that, being of this material, it should be so large. Its dimensions are $14\frac{7}{8}$ inches long, $2\frac{7}{8}$ inches wide. Its exact thickness is not known, but supposed to be $\frac{3}{8}$ or $\frac{1}{2}$ inch. The flakes, which are struck, by which it was reduced to its present appearance, are extremely broad, some of them $1\frac{1}{4}$ inches, many of them $\frac{3}{4}$ inch, and correspondingly thin. They have been struck from the edges on both sides and approach the center, leaving a slight ridge. The point is sharp, the edges sharp and symmetrical, while the base finishes with a slight stem. The dexterity shown in the chipping of this instrument is worthy of all praise. With the proper material such an implement might be made in a very short time if the artist who made it was skillful, but it undoubtedly required a vast deal of practice to enable him to perform the work at all. This specimen is a satisfactory example of the ability of the prehistoric artist to perform any work of this kind, however difficult. It shows his perfect control over his material and his ability to work it according to any style and in any way or to any shape that his fancy might dictate.

Plate 27 represents five specimens out of a cache of fourteen, found on the banks of the Little Missouri River, Pike County, Arkansas. These are introduced as specimens of the art

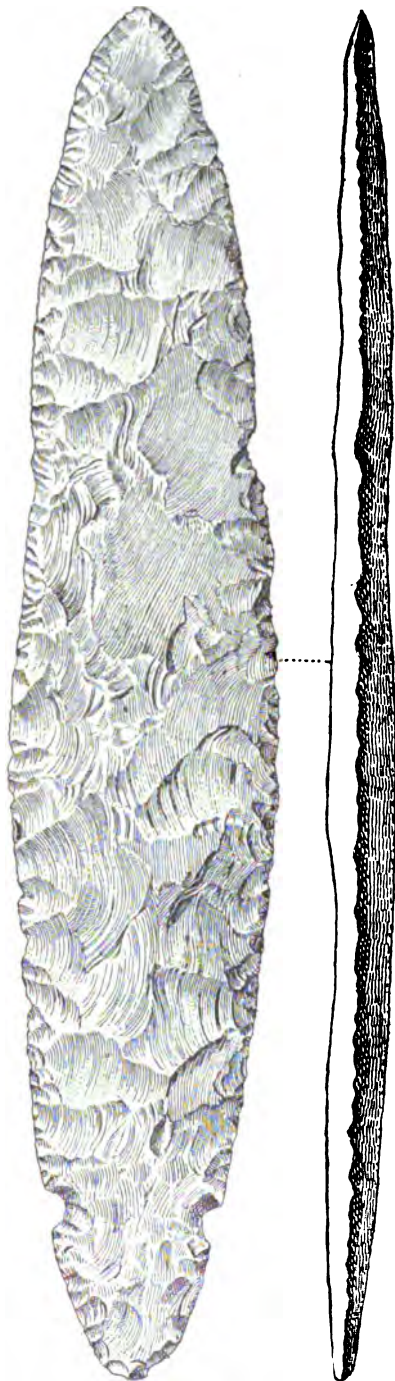


FIG. 82.

LEAF-SHAPED FLINT IMPLEMENT.

Found by H. M. Ellington,
Gillmer County, Georgia.
Cat. No. 3099, U.S.N.M. † Natural size.

of flaking, showing, as they do, the large flakes struck off by a blow, with the conchoid of percussion, and the smaller ones without the conchoid, made by pressure. They are of milk-white chalcedony, and are from 11 inches in length down.

Fig. 82 represents a leaf-shaped implement $9\frac{1}{2}$ inches long, from Gilmer County, Georgia. It was found by Mr. H. M. Ellington while dig-

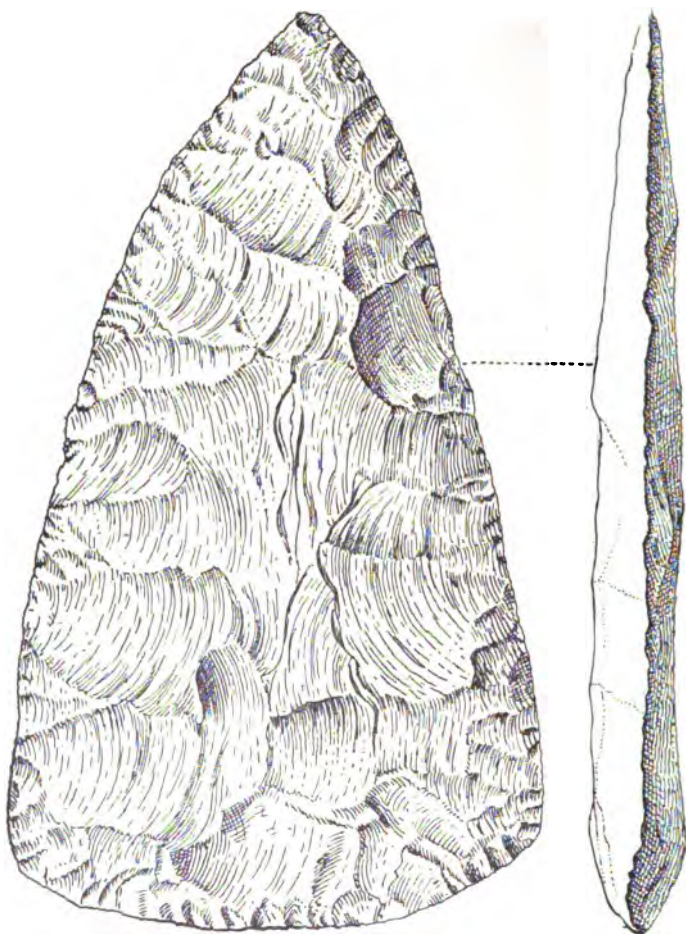


Fig. 83.

LEAF-SHAPED IMPLEMENT OF WHITE FLINT, BEAUTIFULLY WROUGHT.

Columbia County, Georgia.

Steiner Collection. Cat. No. 17559, U.S.N.M. Natural size.

ging in a prehistoric grave, 3 feet beneath the surface. No opinion is expressed with regard to its function, and no consideration is given to the peculiarity of its leaf-shaped form nor to the two notches near one end. It is to be remarked, however, that the proportion between the width and thickness, which made its appearance in the Solutrén epoch, is maintained in this specimen as it is in all those belonging to the Neolithic period. This notable difference between these and the Chellén

implements is continually to be kept in view. The material of this specimen is not flint, is light reddish in color, comes from a ledge and not from a nodule, is coarse grained and refractory, is not homogeneous, and does not break with a regular or conchoidal fracture. But with these disadvantages, apparently insuperable to a modern archaeologist, the ancient artist was able by his skill to produce as fine a specimen of art work as is here presented. But for its material and the two small notches in one end it might pass for one of the leaf-shaped implements of the Solutrén period from western Europe.

Fig. 83 represents a beautiful implement of nearly white flint, covered with a noticeable patina and wrought in accordance with the exigencies of high art in flint chipping. It belongs to the Steiner collection, and comes from Columbia County, Georgia. It greatly resembles and compares favorably with a specimen from Casa de Moura, Portugal, figured by Cartailhac,¹ as a notably beautiful specimen of art work.

Fig. 84 represents a fine-art spearhead from La Paz, Lower California, collected by Mr. James Viosca, consul, sent to the National Museum through Mr. L. Belding. It is not leaf shaped, but has a stem. Its appearance indicates that the maker was an artist in



Fig. 84.

SPEARHEAD, CHERTY FLINT.

La Paz, Lower California.

Cat. No. 61407, U.S.N.M. Natural size.

¹ *Prehistorique de l'Espagne.*

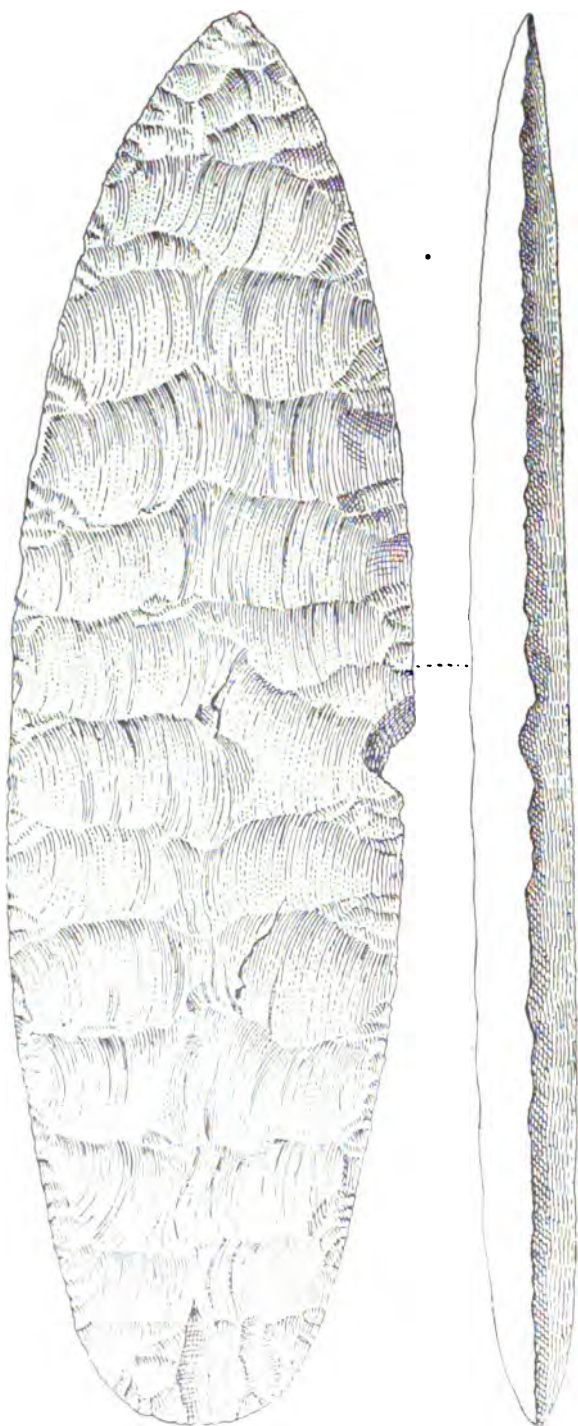


FIG. 85.

LEAF SHAPED IMPLEMENT, CHERT (NODULE).

Naples, Illinois.

Fine specimen of flint, blipping; the flakes are broad, thin, and regular. Cat. No. 43133, U.S.N.M. Natural size.

flint chipping. Its length is $6\frac{3}{4}$ inches, width $2\frac{1}{2}$ inches, thickness $\frac{5}{16}$ inch.

Fig. 85 is from a mound near Naples, Illinois, collected by Col. J. G. Henderson. It is of the brown pyromachic flint. It is one of the superior specimens of art in flint chipping; it is leaf shaped, though one end is rounded while the other is pointed; is $7\frac{1}{4}$ inches in length, $2\frac{1}{2}$ inches in width, and $\frac{1}{2}$ inch in thickness. There are few specimens to be seen better representing fine art in flint chipping than does this. The artist who made it manifests his ability at every step. He shows that he can embody any design of fantasy or improvisation in the way of flint chipping which his imagination suggested. This art work is not simply the chipping of flint by which the object is reduced in its proportions to a given standard, but the artist has been able to accomplish that end by chipping the flint in any way he desired. It is not in the making of a single flake that he shows his excellence, but rather that he should have been able to repeat them with exactitude as many times as he might wish. The flakes have been stricken from each edge toward the center. This has made the flakes to be about an inch long. There are about eleven of them in 6 inches of space, making each one slightly over half an inch wide. They are extremely thin, one might say "as thin as paper," but they are really about as thick as a sheet of tin. So we have flakes an inch long, half an inch wide, and thin as tin sheets, that have been struck off consecutively, each one exactly like the other, to the number of forty-four, without a single miss-stroke or failure.

The foregoing specimen of fine art is worthy all praise for its excellence in flint chipping, but the next (fig. 86) is a finer specimen of art, more difficult to make, and worthy a higher admiration. It comes from the same mound as did the former and was collected by the same gentleman. It is not so large, being only $3\frac{3}{4}$ inches long, $1\frac{1}{4}$ wide, and $\frac{1}{4}$ inch thick. It is of the same brown pyromachic flint as the former, but has a finer patina. The chipping being described, its excellence

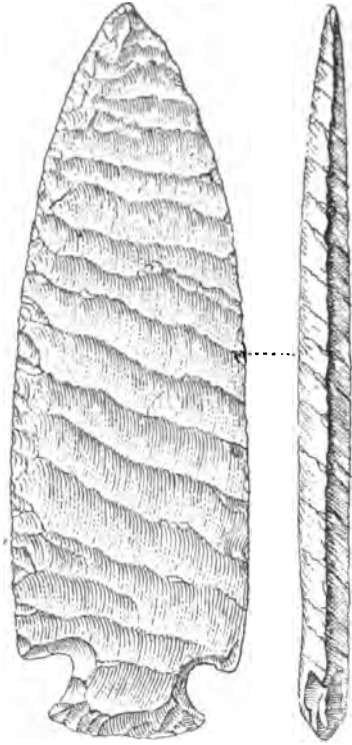


Fig. 86.

SPEARHEAD, STEMMED, SHOULDERED, AND BARBED, CLASS C.

Naples, Illinois.

The finest piece of flint chipping in the Museum. Cat. No. 43133, U.S.N.M. Natural size.

will be apparent. Instead of the flakes being struck from each edge toward the center, as in almost every other specimen, all of them were struck from one edge and went clear across the rounded side to the other edge.

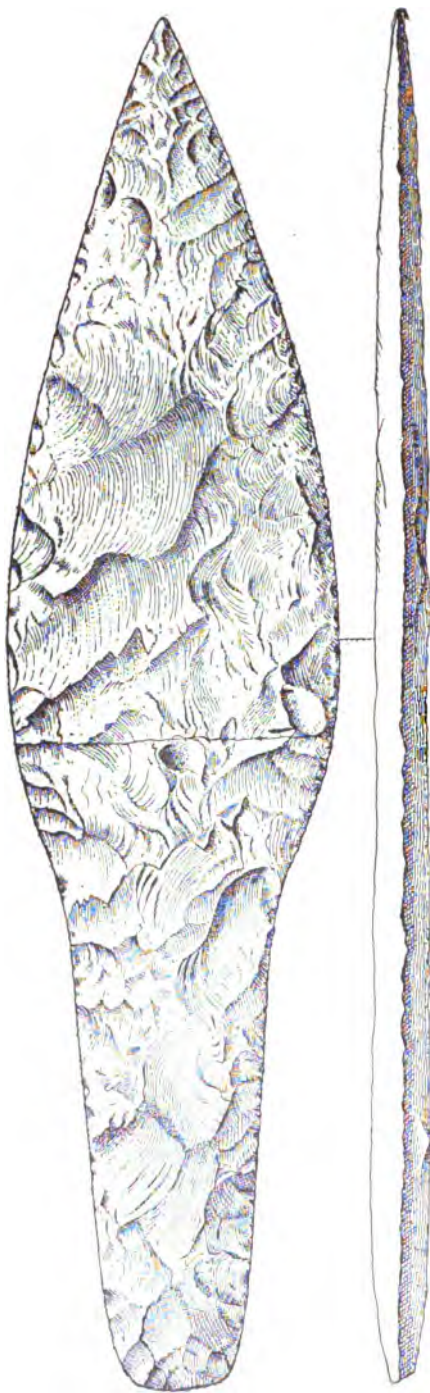


FIG. 87.

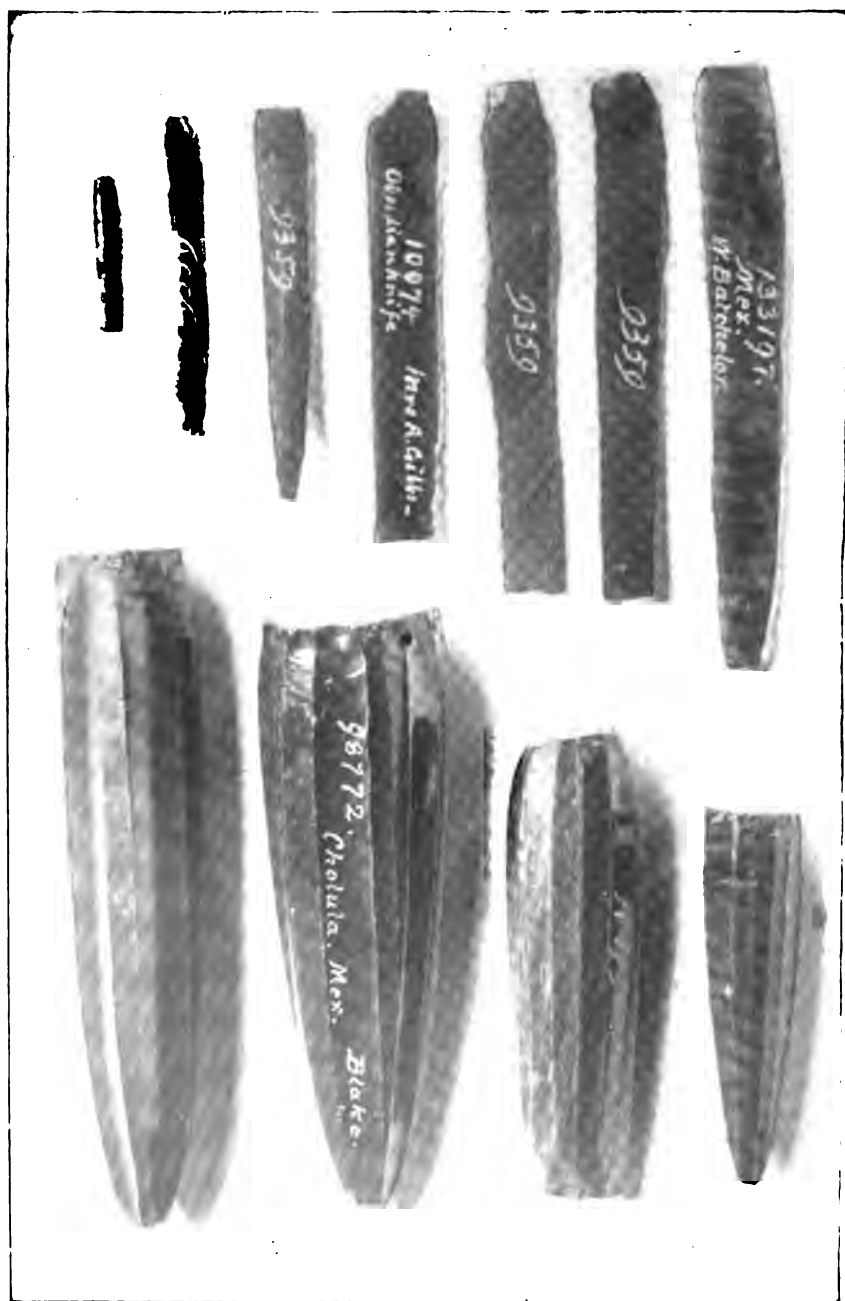
PONIARD OR DAGGER OF WHITE FLINT, FINELY CHIPPED.

Pike County, Illinois.

Cat. No. 32831, U.S.N.M. $\frac{1}{16}$ natural size.

As in the case of the former (fig. 85), it is not the single flake that excites our admiration, but that it should have been repeated with precision and exactitude from one end of the implement to the other and on both sides. These flakes are about $1\frac{3}{8}$ inches in length, $\frac{1}{4}$ inch in width, and about as thick as parchment. Fifteen of these flakes have been struck from each side of this implement—thirty in all. As in fig. 85, the artist has repeated these flakes with precision, difficult as it was, throughout the entire work. Not only was each flake like every other, but the group of flakes on one side of the implement correspond to the group of flakes on the other side.

Reference is made to the dagger or poniard of flint from Copenhagen (Plate 22) as a particularly fine specimen of flint chipping from Scandinavia. Fig. 87 represents a similar implement from the United States, which, though not so good, is submitted for comparison. It is of the white flint, or rather chert with pink patina, from



OBSIDIAN CORES AND FLAKES FROM MEXICO AND CALIFORNIA.

Cat. Nos. (see specimens), U.S.N.M. † natural size.

Pike County, Illinois, and was found by Mr. Brainard Mitchel. Its length is 10½ inches.

Obsidian.—The art of chipping required such material as was homogeneous and would break with a clear fracture. All that did so broke with a conchoid. Obsidian possessed these qualifications. It broke with a sharp, smooth edge and a clear fracture, and was, with flint, a favorite with the prehistoric stone-chipping artist. The United States National Museum possesses hundreds of cores or nuclei of obsidian and thousands of flakes which have been struck therefrom. The cores are 6 or 7 inches in length and under. Some have had flakes struck off all round, and others only part way. These flakes have all been knocked off by a blow at the top, each blow making a flake. There are as many as sixteen flakes which have been struck from a single core, and this has been repeated in lesser numbers among many cores. The difficulty of this work and the art displayed in its performance is manifested by the fact that the artist was able to reproduce these cores and flakes in the large and indefinite numbers suggested. He seemed to be able to determine the size and weight of his hammer and manipulate the blow with sufficient force and accuracy to repeat the result any number of times, producing at his pleasure hundreds or thousands of specimens practically alike. Plate 28 represents selections of these cores and flakes. These particular specimens are from Mexico, but similar ones have been found throughout the Rocky Mountain region of the United States and on the Pacific Coast, and are not uncommon in every part of the world where this material is obtainable. The island of Crete is notable for the number of these objects, though they are all small. Fig. 88 represents a large hooked implement of obsidian from Tepoxtlan, Mexico,

Cat. No. 9694, U.S.N.M. ½ natural size.

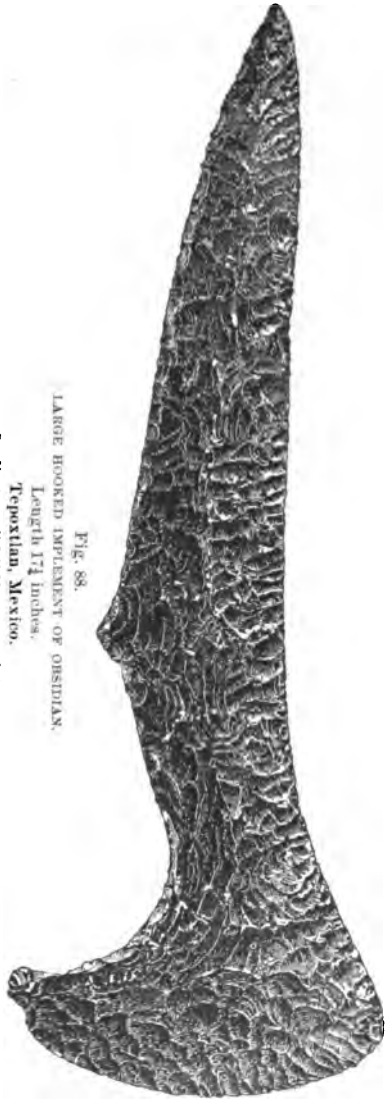


FIG. 88.
LARGE HOOKED IMPLEMENT OF OBSIDIAN.

Length 17½ inches.

Tepoxtlan, Mexico.

Its length is $17\frac{1}{4}$ inches, width $2\frac{1}{2}$, and its thickness $\frac{3}{8}$ inch. It maintains the same high standard of flint chipping as shown in most of the other specimens. Its art work is well shown in the figure.

Fig. 89 represents an obsidian blade of large size, which, for want of a better name, has been called a sword. Its length is 15 inches, width $2\frac{3}{8}$, and thickness $\frac{5}{8}$ inch, and is from a mound in Oregon. It is an example of fine and delicate chipping, which does credit to its maker as an artist of the first-class.



Fig. 89.

OBSIDIAN BLADE (SWORD?).

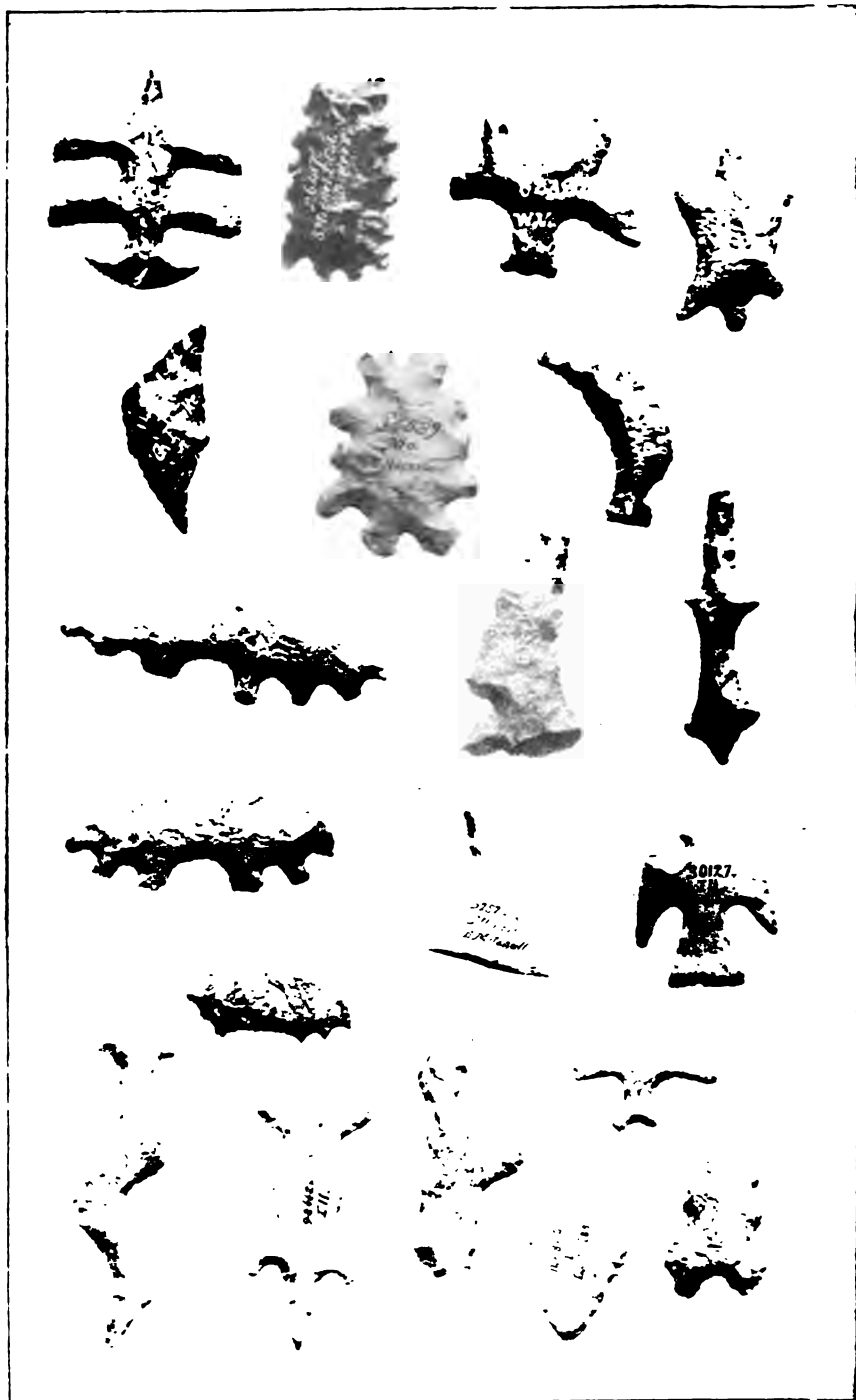
Oregon.

Cat. No. 30180, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 90 is a beautiful specimen of rose quartzite. Its fine grain alone rendered its manufacture possible. Quartzite is a refractory material, and it would have been a testimonial to the ability of the artist had he made an implement, without regard to its elegance or symmetry. However, he has succeeded admirably in these points, for the implement is nearly perfect in both regards. The flakes by which it was reduced were extremely small, and the work proceeded little by little. The artist must have used the greatest care. No owner of this beautiful specimen would risk a single blow upon it such as must have been given a hundred or more times in the course of its manufacture.

Figs. 91 and 92 are other specimens of flint chipping, maintaining the standard for excellence in this art. The former is from Groveport, Ohio, and was collected by Mr. W. R. Limpert. The latter is also from Ohio, collected by Prof. W. K. Moorehead.

Curious forms.—Fig. 93, *a, b, c, d*, represent four arrowheads, introduced because of peculiarities in the fineness of their flint chipping. Fig. 93*a* is one of gray lustrous flint, approaching chalcedony. It belongs to Division IV, Peculiar forms, Class H, Asymmetric. This specimen, as is the next, is extremely thin, neither of them being much more than one-eighth of an inch in thickness. It comes from Santa Barbara, California, and is one of four collected by Prof. David S. Jordan. Fig. 93*b*, also from California, is of rock crystal and is the thinnest specimen of its kind in the Museum. The chips or flakes broken from these two specimens have been extremely fine and thin, leaving the edges and points smooth and even, while keen and sharp. Fig. 93*c*, also asymmetric, is of gray flint, and from Chicago. Its finder was Mr. Carl Dilg, and he has named this specimen the "Riverside arrow." Fig. 93*d* is presented

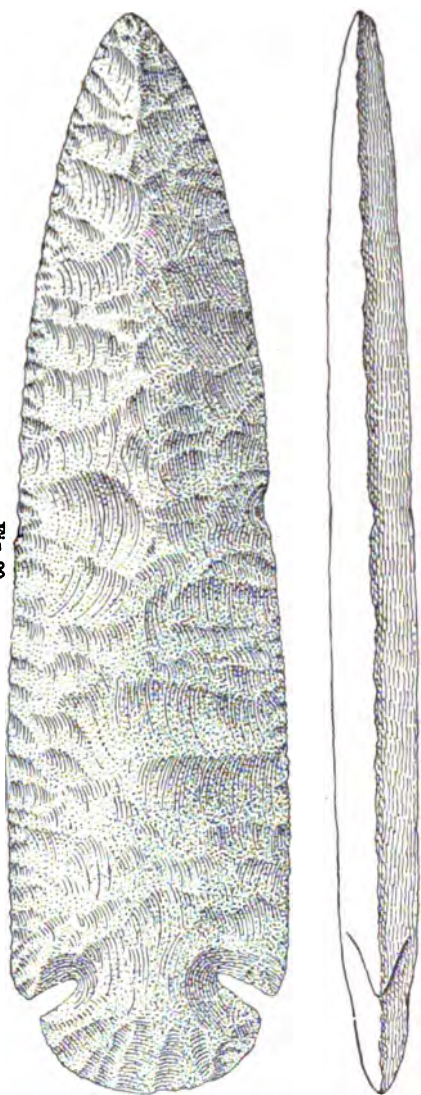


TWENTY FLINT OBJECTS OF CURIOUS FORM, NONE UTILITARIAN.
Cat. Nos. (see specimens), U.S.N.M. $\frac{1}{4}$ natural size.

because of the extreme fineness of the point and the thinness of the implement. It comes from San Marcos, Texas, and was collected by Mr. H. von Beyer. It is the yellow beeswax flint common to that country.

It has been remarked many times throughout this paper that the prehistoric artist possessed sufficient confidence in his ability, and displayed such control over his tools and materials as enabled him to make anything out of flint that his fancy might dictate; he did not confine himself to utilitarian objects, but was an artist in the true sense of the word; that is to say, he dealt with art for art's sake, for the sake of making something which should be beautiful and whose only purpose, according to the canon of art laid down by Sir John Collier, would be to please his eye and to gratify his taste. The prehistoric artist in flint obtained, in some way, we know not how, possibly by study and contemplation, possibly by education, possibly by accident, an ideal which he reproduced in flint. Plate 29 represents twenty objects taken at hazard from the interior of the United States, principally from the Ohio and Mississippi valleys, all of flint, in curious and rare forms, believed to be entirely without utility and solely to gratify an artistic desire. None of them are arrow or spear heads, and none of them appear to have been made for any service. They are the work of a master who, conscious of his ability, is playing with his art. One represents a bird, one a snake, one an outstretched beaver skin, two of

Fig. 80.
SPEARHEAD, STEMMED, SHOTLEDGERED, AND BARBED, CLASS C.
This beautiful specimen is of rose quartzite, more refractory than flint.
(Cat. No. 13997, U.S.N.M. Natural Hist.)



represents a bird, one a snake, one an outstretched beaver skin, two of

them, by stretch of the imagination, might represent four-footed animals; the rest have no likeness to any known object. All of them are worked from flint or some similar stone; one is of obsidian; they are

represented about natural size. This series, with fig. 93, shows what the prehistoric artist in flint was able to do in the management and control of his tools and materials in making fanciful objects.

The foregoing specimens are small, and, consequently, might be considered as toys or playthings and of no value to the prehistoric artist, yet it would be an error to predicate a theory upon this, for there have been others equally trivial and apparently of as little utility which bear evidence of fine art work and yet are of large size. Fig. 94 represents one of a series of these large flint implements chipped into fanciful form. This particular one is from Humphreys County, Tennessee, and was collected by Mr. Ed-

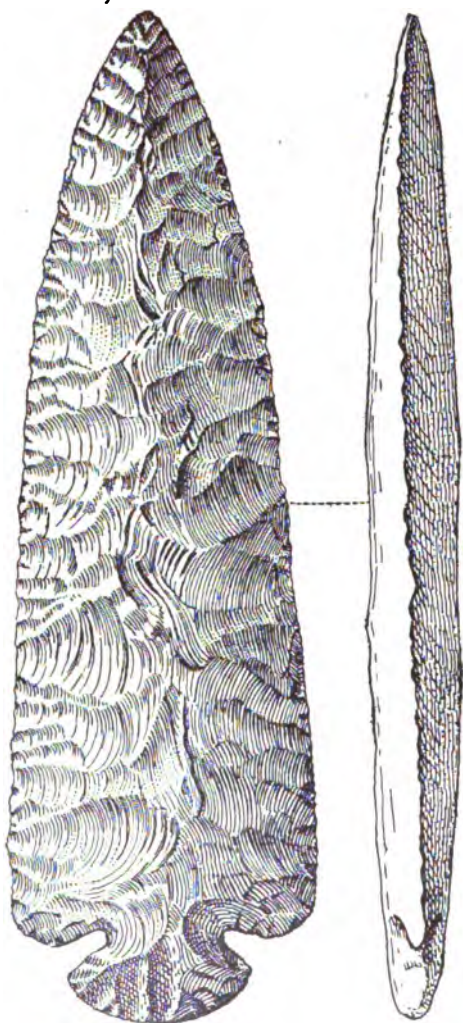


Fig. 91.
SPEARHEAD OF CHALEDONIC FLINT.
Side and edge views.
Groveport, Ohio.
Cat. No. 7469, U.S.N.M. Natural size.

ward W. Hicks. It is $11\frac{1}{4}$ inches in length and $4\frac{1}{2}$ inches in width. Other specimens of similar workmanship, but of different though of equally fanciful form, have been found in the same as well as other localities. Gen. Gates P. Thruston¹ has described these at length.

¹ Antiquities of Tennessee, pp. 230-252.

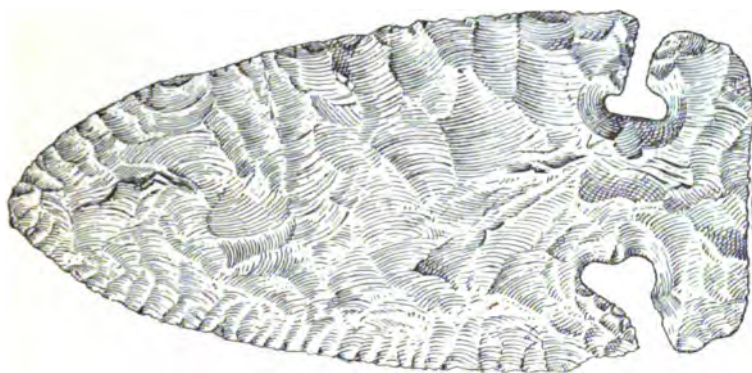


Fig. 92.

SPEARHEAD, STEMMED, SHOULDERED, AND BARRED, CLASS C.

White and rose flint.

Ohio.

W. K. Moorehead. Cat. No. 172831, U.S.N.M. Natural size.

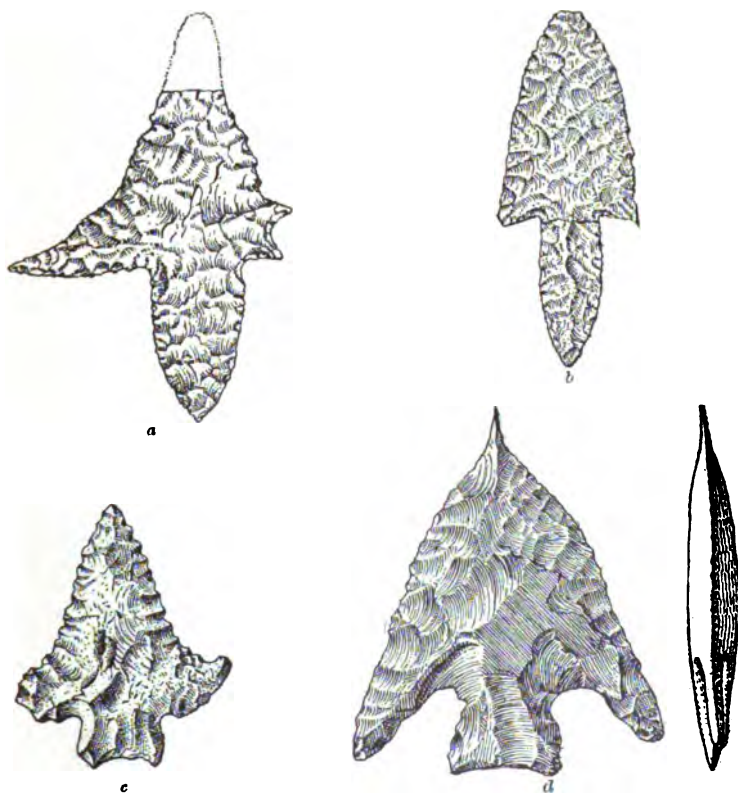


Fig. 93.

FOUR ARROWHEADS OF FLINT FINELY CHIPPED, WITH SHARP EDGES AND FINE POINTS.

Cat. Nos. 43060, 149373, 3287, U.S.N.M. Natural size.

POLISHED STONE HATCHETS.

While the chipping of stone continued throughout the Neolithic, as it had in the Paleolithic period, there was added to it a newly discovered art by which the implement might be made smooth and sharp. This discovery was the grinding or polishing of stone implements and bringing out the beauty of their form and symmetry, showing with truth and accuracy the fine lines upon which they had been wrought, and adapting them to utilitarian objects, tools, and weapons.

The characteristic implements of the Neolithic period are the polished stone hatchets. They are found practically all over the world, showing that the Neolithic civilization must have comprised an extensive population and endured for a long period of time. The material of which these implements were made differed according to locality, but, notwithstanding all differences, their general likeness prevails throughout the world. While an experienced prehistoric archaeologist may deter-

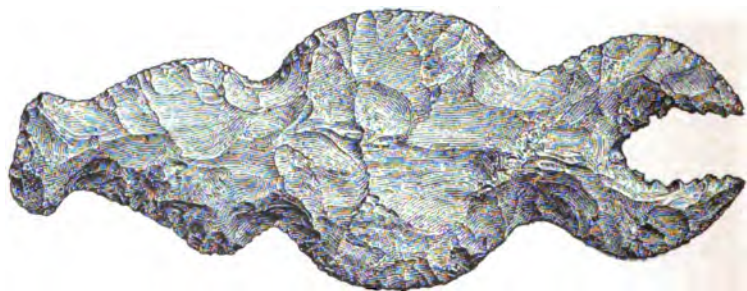


Fig. 94.

FANCIFUL FORM (LOBSTER CLAW) OF FLINT.

Length, 11 inches; width, 4 inches.

Humphreys County, Tennessee.

Cast, Cat. No. 38665, U.S.N.M. $\frac{2}{3}$ natural size.

mine, from an inspection of a polished stone hatchet, from what country it comes and possibly to what locality in that country it belongs, yet the statement is true that they are substantially the same implement. The invention of the arts of grinding and polishing, together with the form of the hatchet, have been transmitted by migration or communication from people to people and from country to country; and the knowledge of the implement and the operation by which it was made descended from generation to generation and spread until it covered the five continents. A series of the polished stone hatchets from almost any one of the United States will stand as fair representatives of the same implement of any other country. The single exception to the universality of this statement is Scandinavia. Fig. 95 shows the flat side of a polished stone hatchet at the close of the first stage in the manufacture. The object is reduced to its general form, and in this stage it has often been mistaken for a Paleolithic implement. Fig. 96 represents the second stage of manufacture. Here a smaller hammer (fig. 28) is used, or possibly a bone flaker; the chips or flakes removed are smaller, and, in the opinion of some archaeologists, were made by

pressure instead of being struck off; the edges of the implement are made regular, the surface reduced to a level, and the entire object is made ready for polishing.

Another method, different, but similar, was employed with the non-chippable materials; that is, hammering or pecking (*martelage*). The same stone hammer was used, and by repeated strokes in the same place the refractory substance is gradually reduced by abrasion to the desired form.

The implement having been reduced, approximately, to the desired form by either of the foregoing methods, the next step required a grinding or polishing stone. These grinding stones are found wherever the polished-stone culture existed. They are numerous in France and England. The National Museum possesses specimens from Massachusetts and from Tennessee. Fig. 97 represents one of these grinding stones from the bank of the Hiawasse River, 15 miles east of Charleston, Polk County,

Tennessee. It was found by Mr. N. G. Baxter, and presented by him (through Mr. Edward Palmer) to the United States National Museum in 1882. It was reduced from a much larger piece, believed to

have been solid, in order to be transported to the Museum; its present surface measurement is 22 by 14 inches. There are three grooves shown, all made by the grinding process. The largest and principal of these is 17 inches long, 5 inches wide, and $1\frac{1}{2}$ inches deep, evidently made by rubbing the flat side of the hatchet thereon. One of the smaller grooves is deeper and narrower, and has doubtless served for the corners, edges, or ends of the hatchet. This grinding stone was the principal object or tool of the prehistoric workshop wherein it was found, for around it were collected no less than forty chipped and pecked implements ready

to be, or in the process of being, polished. The chipped stone implement (fig. 96) is laid upon the grinding stone (fig. 97) and rubbed back and forth until ground smooth. Water might be used with it, but it should make its own sand. Fig. 98 represents the implement partially smoothed, the ridges rubbed off, and approaching completion. Fig. 99 represents the completed implement, it having been smoothed over its entire surface, save possibly some insignificant places where the fractures of chipping were too deep to be easily ground out.



Fig. 95.

HATCHET OF FLINT RUDELY
CHIPPED, FIRST STAGE,
OF MANUFACTURE.
Cat. No. 99916, U.S.N.M.
 $\frac{1}{2}$ natural size.

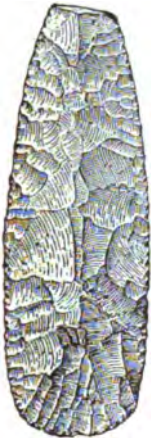


Fig. 96.

HATCHET OF FLINT FINELY
CHIPPED, SECOND STAGE,
READY FOR GRINDING.

Cat. No. 99915, U.S.N.M.
 $\frac{1}{2}$ natural size.

POLISHED STONE HATCHETS—SCANDINAVIA.

The polished stone hatchets from Scandinavia are unique. Many of them are different in form and size from those of other countries. They are larger and smoother, and have been found in such numbers in the various stages of manufacture, showing the method so admirably, and are such fine examples of art work that it would be improper to omit them. Plate 30 represents two of these hatchets. They are of the flint belonging to the country. Fig. *a* represents a hatchet chipped to form, square in section, with poll and edge indicated, and shows the process of chipping completed as indicated by fig. 96, while fig. *b* shows the process of grinding completed as indicated by figs. 98 and 99. Many of these implements are of large size, 16 inches in length not



Fig. 97.

GRINDING OR POLISHING STONE FOR THE MANUFACTURE OF HATCHETS.

Hiawassce River, Polk County, Tennessee.

Cat. No. 65712, U.S.N.M. $\frac{1}{2}$ natural size.

being unusual. Their size, with their elegance and delicacy of chipping and grinding, so increases the difficulty of their manufacture as to take them definitely into the realm of fine art.

POLISHED STONE HATCHETS—HANDLED.

The frontispiece represents the method of handling these hatchets. Similar specimens have been found in almost every part of the world, though not in great plenty. The American Museum of Natural History possesses one, but the United States National Museum is the fortunate possessor of two. One of these comes from Syracuse, New York, collected by Mr. Charles M. Crounse, the other gathered by Mr. Byron E. Dodge, of Richfield, Genesee County, Michigan. Other specimens have been found in different prehistoric countries, sometimes with the handle or its fragments attached, and again with the evident marks of a



TWO FLINT HATCHETS.

a, Chipped to form; *b*, polished.

Lund, Sweden.

Cat. Nos. 101035, 100980, U.S.N.M. ‡ natural size.

handle on the hatchet, and this method of handling has been accepted as that employed in prehistoric times.

These polished stone hatchets have been made with certain art characteristics locally peculiar. In Brittany the hatchets of precious stone have been made with pointed poll and a sharp ridge in the center toward the poll. Another peculiarity of the same locality is a button on the top or poll end of the hatchet. The same kind of a button appears on those from Guadeloupe and other islands of the West Indies. Those from Illinois have the edge broadened, as if in imitation of a bronze or copper hatchet which has been hammered to an edge and thus spread at the edges and corners. The same broadening at the edge appears in some of the hatchets from Chiriqui, though not to so great an extent as in Illinois. A peculiarity of some of the Chiriqui specimens is that, instead of being made round, square, or oval in section; they are hexagonal. These peculiarities are noticed on account of their apparent artistic feeling, and because they seem to have had no utilitarian origin. The differences in form have been mentioned as peculiarities, and so they are, for they do not apply



Fig. 99.

POLISHED STONE
HATCHET COM-
PLETED.

Cat. No. 35164, U.S.N.M.
 $\frac{1}{2}$ natural size.

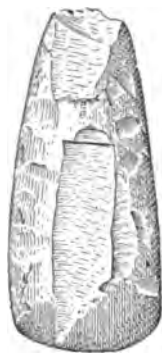


Fig. 98.

HATCHET OF FLINT,
PARTLY GROUND,
THIRD STAGE.

Cat. No. 99995, U.S.N.M.
 $\frac{1}{2}$ natural size.

to all the hatchets from their locality. They seem to have been fairly within the definition of art, being an attempt to decorate an object of utility, to make it more pleasing to the eye, and to be art for art's sake. No decorative designs ever appear on these implements, no inscriptions, and no marks of ownership.

One must not forget that, despite all these varieties of art forms of hatchets, prehistoric man continued to make and use this general form of hatchet throughout the prehistoric world.

There has been not a little scientific discussion over the proposition that civilization travels along the line of least resistance; that man in performing sociologic, technologic, or industrial operations, does it, or endeavors to do it, in the easiest way, and with the least possible exertion or expenditure of force. This is an attempted application of a law of physics to a condition of sociology. It is undoubtedly a law of physics that certain, possibly all, operations of nature are conducted

along the line of least resistance. The boiler bursts at its weakest spot, the chain breaks in its weakest link. All combinations of matter are made or accomplished on the line of least resistance. The existence of the law must be admitted, but its universality as to natural things is no evidence of its application to human affairs. The condi-

tions between these two, natural and human, are so different, and there is so much dissimilarity, as to invoke different laws. A law of universal application to one may have little or no application to the other.

It may be quite true that in attaining certain results a man may proceed along the lines of least resistance—that is to say, he may seek to accomplish his purpose with the least exertion or expenditure of force. But his wishes and desires interfere many times to deflect his conduct from this line. Free will, reason, and judgment are disturbing elements in man which, not found in nature, profoundly interfere with the operation of this law. They control his actions and deflect his course far from the line of the least resistance. Primitive man may have desired a knife or point for any one of the many purposes for which knives or points are used—to kill or skin his prey, to cut branches, or what not. Any sharp or pointed piece of flint, a spawl, would serve this purpose as well as the more elaborate specimens; yet we have seen that hundreds, if not thousands of times primitive man has not been content with a mere spawl, however sharp and pointed or effective it might be. Its utility alone, however perfect, did not satisfy him.

It was argued in the early part of this paper, and has been demonstrated by many illustrations, that prehistoric man had an æsthetic taste or artistic sense which controlled him equally as did utility.

The first chapter of this paper, with the arts therein elaborated, is built on this foundation. The arts of fine flint chipping, of engraving on bone, horn, and ivory, were all dependent on the æsthetic desire natural in man. The line of the least resistance, that is to say, the making of a knife or point with the least expenditure of force, would have prompted man to have used any spawl of flint or point of bone which could have been made the easiest, provided it would serve the purpose. We have seen that man did not pursue this course; that he was not contented with the rude spawl, however sharp, or the bone fragment, however pointed. His natural desire for beauty, his æsthetic taste, his artistic sense intervened and deflected his course from the utilitarian line of least exertion or resistance.

It will not do to say that the proposition of the accomplishment of results with the least expenditure of force as applied to man is devoid of truth or that it has no exceptions. This sweeping declaration would, like the swinging pendulum, carry us too far to the opposite side, and would be equally as untrue as the original proposition. The truth lies midway between the two. Man in many instances seeks to accomplish his end with the least possible expenditure. Man proceeds in most of his utilitarian projects on the lines of least resistance, and so far as utility has aided civilization there might be a foundation for this law. But art, in this regard is opposed to utility, and it deflects civilization from the lines of least resistance.

Nearly all prehistoric art work would have been avoided if the man who made the implements and objects described had proceeded on the

POLISHED STONE HATCHET AND HANDLE COMBINED, WORKED OUT OF SOLID ROCK. DIORITE (?).
U. S. National Museum. $\frac{2}{3}$ actual size.



lines of least resistance and contented himself with the thing which was cheapest and easiest made, and would have served his utilitarian purpose. Nearly all work done by man for artistic purposes is in opposition to this law, for man's desire for beauty, his æsthetic taste, his artistic sense, induce him to expend an infinite amount of labor in the production of an implement which would have been of equal utility without it. The fine flint chipping and the engraving on bone have been mentioned. The decorations, the great number of which are set forth in plates 13, 14, 15, 19, and 20, were not utilitarian. They were, so far as utility was concerned, a useless expenditure of force, without value, and in defiance of the law invoked.

This statement applies with equal force to many other prehistoric art works. Pottery and bronze objects were almost universally decorated without regard to utility, and only to gratify the æsthetic taste. The jade implements, the polished stone hatchets, the entire list of *forma curiosa*, in fact all the "art for art's sake," and the labor expended to gratify the æsthetic taste of man and to satisfy his innate desire for beauty, were in defiance of this rule.

The foregoing argument can be upheld by many specimens, but its truth is demonstrated by the implement shown in plate 31, and its consideration in connection with the frontispiece.

The arrow- and spear-head were the standard primitive projectile weapons. The ax or hatchet was the standard primitive cutting implement, performing its function by blows. The Paleolithic implements corresponding to these were made usually of flint and solely by chipping. In the Neolithic period the hatchets, while chipped or pecked into shape, were smoothed or polished by friction on a grinding or polishing stone. The various steps of the process are shown in figs. 95 to 99. These or similar implements have been found throughout the world, wherever it was occupied by Neolithic man. Their method of use is shown in the frontispiece, where the original handle was found with the hatchet inserted and ready for use. The discoveries of these handles are rare, owing probably to the ease of their decomposition and destruction, but they have been found in every country associated with the hatchet in such a way as to identify their use in this manner. It has therefore been decided that the primitive man thus used them, and that practically all of the numberless polished stone hatchets found throughout the world have each one had their handle similar to that in the frontispiece. The specimen shown in plate 31, while the same implement as that in the frontispiece, differs from it in that it has a stone handle and has been worked out of the solid. Whether it was a piece of rock from a ledge or a water-worn boulder, we have now no means of determining, for the original surface has been removed in the process of manufacture. It is hard stone, probably diorite; the material is highly refractory and does not chip or flake as does flint. It could never have been reduced even approximately to its present

form by chipping, as was frequently done with similar implements, especially with flint, and of which plate 30 furnishes an excellent illustration. The implement (in plate 31) was reduced to shape by grinding or rubbing and not by chipping. The grinding of an object of this size from its original condition of boulder or ledge rock into the symmetrical weapon here shown must have required immense labor. This work would be long, arduous, tedious, and difficult, and would require of the workman great tenacity of purpose and fearlessness of fatigue. We have no means of knowing the difference between the amount of labor required to make the implement in plate 31 and that shown in the frontispiece, but it may be surmised, for the purpose of argument, that the same amount of exertion, time, and labor expended on the latter would have made a hundred of the first. Yet the implement thus laboriously made is, for all utilitarian purposes, no better than any one of the hundred which could have been made in the same time. Indeed, it is hardly so good, for, being of stone, it is heavier and, as the blade can not be taken out of the handle, it is more unwieldy and troublesome to carry. The only reason apparent that impelled primitive man to make this implement with an expenditure of so much more force than would have been required for the commoner specimen, was the gratification of his æsthetic taste. In order to gratify it, he was willing to expend this extra force. This implement is, therefore, an illustration of what is found to be true in thousands of other objects—that their makers were willing to endure fatigue and labor long continued, in order to gratify their desire for the beautiful. And in proportion as this is true, so did he not proceed along the lines of least resistance, but rather in defiance of the rule.

DRILLING IN STONE.

This was one of the arts of prehistoric man during the Neolithic period. It was continued into the Bronze age and thence down to historic times. It is so difficult in performance, and yet was so successfully performed, as to entitle it to a place among the fine arts. Ordinary drilling performed in a common or clumsy manner might not be entitled to such mention, and the art obtains the right to be classed as fine, only from the number of wonderful specimens which have been found, the difficulty incident to the performance, and the success attending it. Scores of examples can be given from both Europe and America in which the drilling shown is at once delicate and difficult. In America the prehistoric man desiring to make an ax made a groove around it and handled it by a withe. His European brother of the same period drilled a hole in his ax and inserted a handle after the fashion of the sledge. He appeared, in both hemispheres, to be master of the art of drilling, for, contrary to the way of the white man, he made the implement perfect and complete, even to its smoothing and polishing, before he began to drill the hole. As said in the chapter on

flint chipping, he seems to have been able to toy with his art and perform it in any way he pleased. He drilled large holes and small, he used hard drills and soft, the latter even of pine wood. He used hollow drills as well as solid, and we have cores that have been drilled from one or both sides with a straightness and evenness that seems marvelous. He was able to start his drill on the smooth and polished surface of a hard stone, apparently without any wobbling of the drill, leaving the edge of the hole as smooth and sharp as though it had been afterwards reamed or turned. The prehistoric objects found in the mounds of the United States are of even finer workmanship and more artistic than is usual in Europe.

Pipes, tubes, etc.—These objects, sometimes of hard stone, are drilled in a remarkable manner, which, when considered as the work of a savage, done without metal tools, excites our wonder and admiration. The pipes have been drilled in several directions and at different angles.

Plate 74 (in the chapter on musical instruments) represents divers stone tubes supposed to have been used as trumpets or horns, but they will serve as illustrations of the art of drilling. A certain number display this art in a high degree. The long cylindrical tubes do not show to the casual observer their real value as representatives of this art. Although only about 1 inch in diameter and of length varying from 6 to 12 or 14 inches, they have been drilled their entire length with a hole more than one-half their diameter, and all from one end—that is to say, the drilling of this large hole has been begun at one end of the finished tube and continued until nearly through at the other end, when the drilling (of the large hole) was stopped, the tube reversed, and drilled from the other end with a small hole which met the large one. The evidence of this manipulation is abundant, and is here treated as a fine art because of the manual dexterity required to drill accurately and continuously a large hole through so small a cylinder for such a distance without break or change of direction.

It is not intended to pursue the subject of drilling in this paper, only to call attention to its existence as a fine art and to note the delicacy and difficulty in some of the operations as shown by the specimens. The reader who is desirous of pursuing the subject further is referred to the paper on this subject by Mr. J. D. McGuire, published in the report of the United States National Museum for 1894. Many of the specimens described by Mr. McGuire are from the Division of Prehistoric Archaeology.

CEREMONIAL OBJECTS.

Many ceremonial objects show fine execution in the way of stone drilling, and the subject will be continued incidentally during their description.

There were a large series of objects in use among the aborigines of

North America, the purpose of which is unknown, which, for want of a better name and in accordance with a supposed use or function, have been called "Ceremonial objects." Any description of or argument concerning their possible use would be part of the history of the civil-

ization of the times and belongs to technology, or to industrial, but not fine art. They have been pecked or battered into general, then ground into particular form, then polished, and lastly drilled. The correctness of their forms, their symmetry, their smoothness of surface and perfection of detail, together with the supposition of their ornamental and not utilitarian function, causes them to be classed among objects of fine art.

Banner stones.—This name has been given empirically and only for want of a better. Fig. 100 represents one of these implements, half size. It was found near Dubuque,

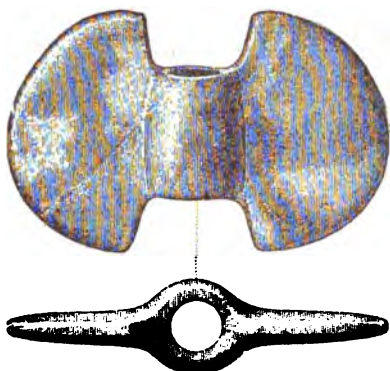


Fig. 100.

BANNER STONE, QUARTZ, DRILLED AND FINELY POLISHED.

Illinois.

Cat. No. 30191, U.S.N.M. $\frac{1}{2}$ natural size.

Iowa, by Mr. H. T. Woodman, is of ferruginous quartz, translucent, reddish color passing over to white, within one or two degrees of being as hard as the diamond. Despite all its rounded corners and smoothed edges it will scratch glass without difficulty. It has been hammered or pecked, ground, polished and drilled, and its entire surface made smooth as glass. It is symmetric viewed from either side or edge. The amount of skilled labor required to reduce it to its present elegant appearance, the difficulties in accomplishing this, all of which was only to produce an ornament, justifies its classification among objects of fine art. Fig. 101 represents another specimen of the same kind. It has been finished in the manner just described, and it is submitted with the same idea. It was found in Prince George County, Maryland, and was contributed by Dr. E. E. Reynolds.

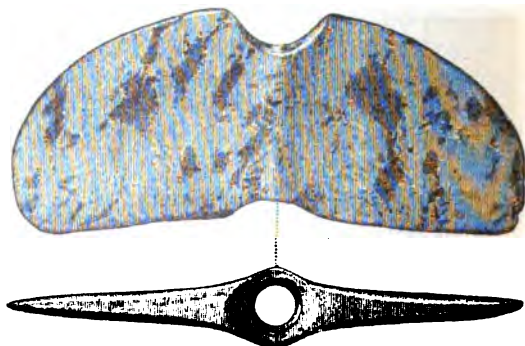


Fig. 101.

BANNER STONE, SYENITE, DRILLED AND FINELY POLISHED.

Prince George County, Maryland.

Cat. No. 34648, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 102 represents another banner stone of the same general style, introduced because of its beauty and the fineness of its manufacture.



THREE BANNER STONES (TWO BROKEN).
Cat. Nos. 42540, 17923, 115685, U.S.N.M. $\frac{1}{2}$ natural size.

The thinness of the blade as well as of the barrel or center, with the size of the hole, leaving the walls so thin and frail, are all to be remarked as evidence of the mechanical skill and manual dexterity of the aborigines. Fig. 103 is an implement which may or may not be one of the banner stones, but it is evidently related thereto. It might pass for a hatchet or double-bitted ax, the hole being drilled in the center as for a handle, but this use is negatived by the fragility and softness of the material, which is banded slate. The entire surface is highly polished and the outlines are true and correct. The edge is as sharp as the material will make. The hole, however, is quite too small for a handle by which the implement could be used as an ax.

A single blow would destroy it, breaking both its edge and the hole. A ceremonial use is the only one suggested for these and similar implements. Fig. 104 was received from Peale's Museum, Philadelphia, and was originally from near Norristown, Pennsylvania. It is of slate, and has been worked up to its present perfected state by the operations



Fig. 103.

BANNER STONE OF BANDED SLATE.
Paris, Kenosha County, Wisconsin.
Cast, Cat. No. 11691, U.S.N.M. $\frac{1}{2}$ natural size.



Fig. 102.

BANNER STONE.

Hudson City, New Jersey.

(Original Amer. Mus. Nat. Hist., New York.) Cast, Cat. No. 1170, U.S.N.M.
 $\frac{1}{2}$ natural size.

already described. The form is peculiar and shows the non-utilitarian character of the implement. The sectional view explains the drilling. Plate 32 represents three of these objects. The first, from Tennessee, is whole; the sec-

ond has been broken in half and drilled as though for secondary use—possibly as a pendant. These two specimens are introduced to show the decoration, consisting of fine notches like saw teeth cut in the edges, and are the only pieces so marked in the entire series of these objects in the United States National Museum. In the one object these notches have been cut at right angles on the edge, while on the other

they have been cut on only one side of the edge. The purpose of these notches is entirely unknown; they might have been utilitarian or ornamental, but in our present state of knowledge no one is justified in saying which. They are submitted as possible ornamentation. The third specimen represents one of these objects in which the drilling has just been completed, when the object split longitudinally. It is presented to show the drilling with all its interior ridges before being smoothed, and one may see by the failure to complete the hole how the

drilling had all been done from one end.

Bird-shaped objects.—Fig. 105 is from western New York. It is made in the form of a bird, which from the number of similar specimens have given the name to this class. The eyes are represented by great protuberances which must have greatly increased

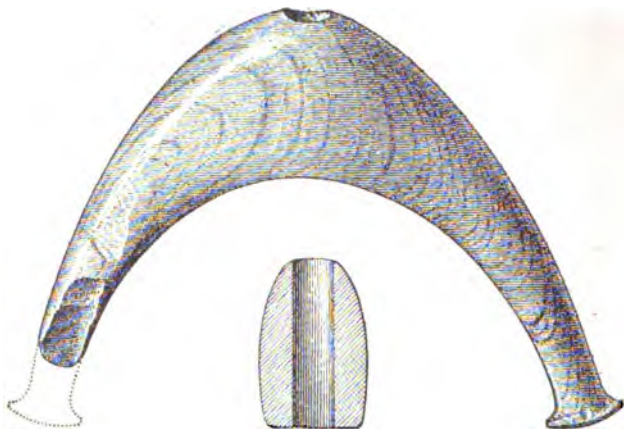


Fig. 104.

BANNER STONE OF SLATE, CURIOUS FORM, BROKEN.
Norristown, Pennsylvania.

Cat. No. 8024, U.S.N.M. $\frac{1}{2}$ natural size.

the difficulty of manufacture. It was made from a boulder or large piece, and while the material is hard, it is not tough but rather fragile. It could not be chipped like flint nor whittled like soapstone, but must have been hammered or pecked into shape and afterwards ground to its present form, then polished until it is as smooth as glass. A consideration of the conditions demonstrates the difficulty of making this object and the dexterity and experienced working required. The United States National Museum possesses many of these specimens. While they bear a greater resemblance to birds than anything else, yet scarcely any two of them are alike, and they change in form through the whole gamut until it is difficult to determine whether it is a bird, a lizard, or a turtle, and finally the series ends in a straight bar without pretense of representing any animal.

Boat-shaped objects.—Fig. 106 represents a boat-shaped object, so called for the same reason that others were called bird shaped—because it was nearer that than anything else. There is an extensive series of these, from those closely resembling a boat and elaborately and carefully made to those of the rudest form. They, like all the others, have been brought to the general form by hammering or pecking and then grinding and polishing. Their purpose, also like the others, is unknown.

It has been suggested that certain of them of the plainer kind were twine twistors, handles for carrying parcels, or for tightening cords or lines. A Mohawk medicine woman declared them to be amulets or

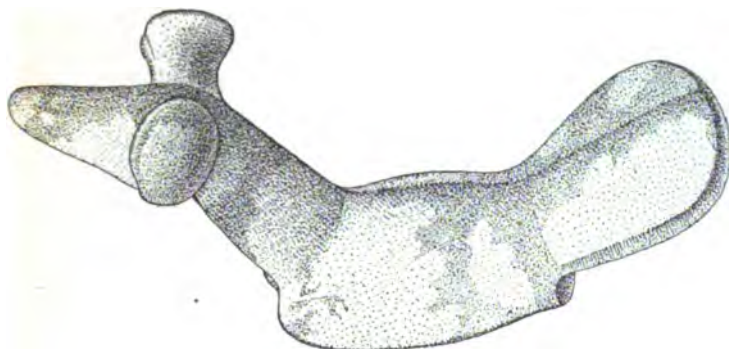


Fig. 105.

BIRD-SHAPED (?) OBJECT.

Western New York.

Cat. No. 32258, U.S.N.M. $\frac{3}{4}$ natural size.

charms to enable the witches to ferry themselves over streams of water, as the broomstick serves modern witches for flight through the air. If this object should be lost, it was believed that her power of flight or

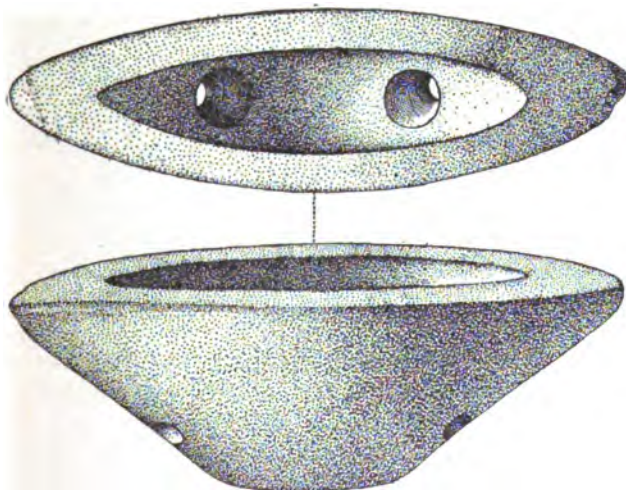


Fig. 106.

BOAT-SHAPED OBJECT.

Sterling, Connecticut.

Cat. No. 17903, U.S.N.M. $\frac{3}{4}$ natural size.

passage was gone. Contrary to every possible usage of these objects as boats, even as toys, they are all drilled and usually with two perforations.

The forms of this implement are varied. Fig. 107 represents one of these objects apparently at the other end of the series, while there are others of intermediate form. This one is flat, thin, not hollowed out, is narrowed in the middle and widened at the ends, and has its two holes drilled close together. Many of these objects are of hard stone, like syenite, greenstone, etc., while a limited number are of galena. Their general purpose seems to have been as an ornament of some kind, which, with their symmetry, execution, finish, and the difficulty in accomplishing all these, entitles them to be classed among objects of fine art.

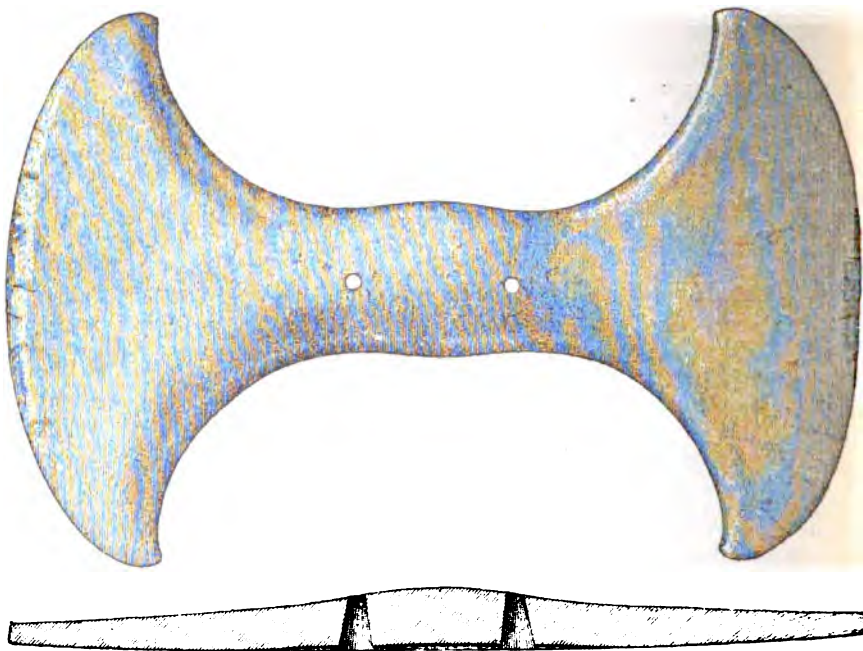


Fig. 107.

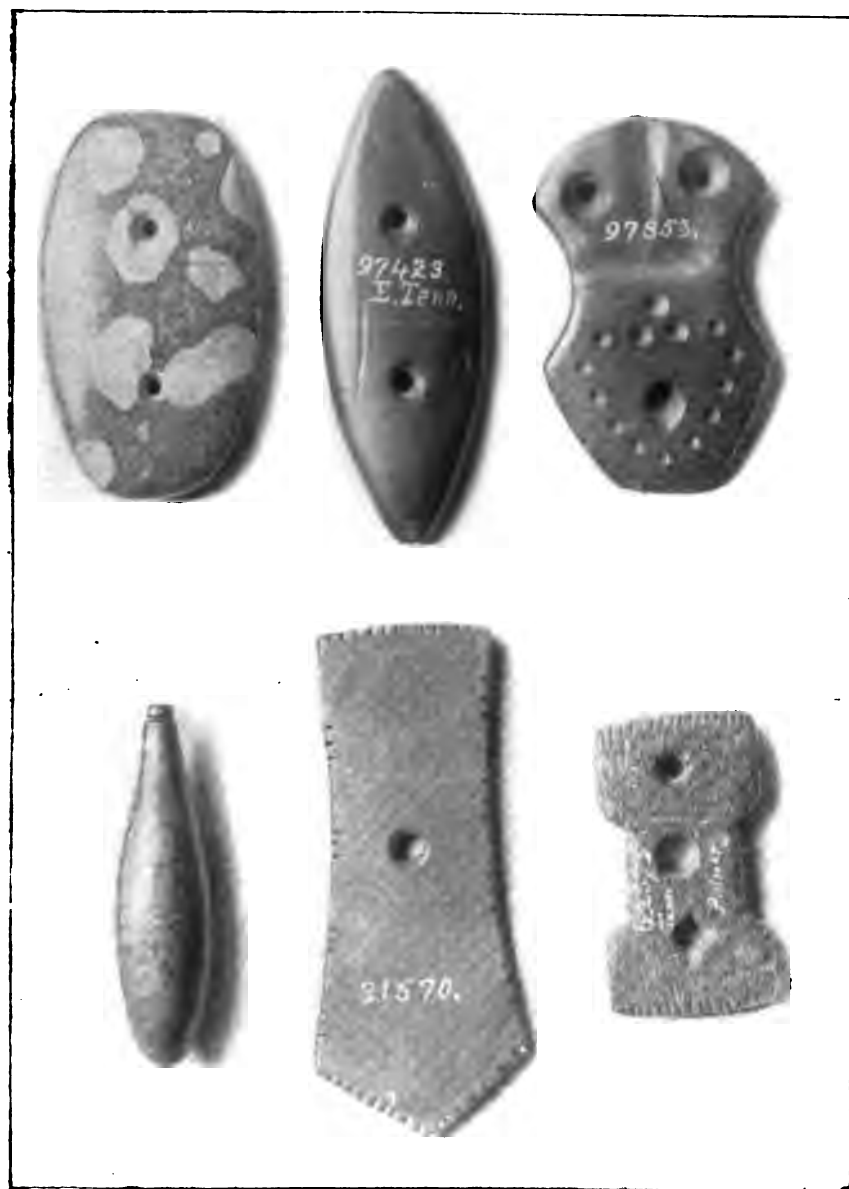
BOAT-SHAPED OBJECT (?) OF PECULIAR FORM, SLATE.

Indiana.

Cat. No. 98059, U.S.N.M. $\frac{1}{2}$ natural size.

Gorgetts and pendants.—These were also objects of ornament and ceremony. Most of them are of slate, thin, not difficult to make, nor yet particularly beautiful when made. Others, however, either from their material or otherwise, become more difficult and have certain ornamentation, and should not be omitted from among decorative art objects. The difference between the gorget and pendant seems only to have been in the number and position of the holes. A gorget might have been fastened upon the arm as an ornament, while a pendant, unless very small, could scarcely be, though both may have been suspended from the neck and worn on the breast.

Plate 33 represents five of these objects, the sixth being of hematite and passing under another denomination. The first (No. 139531, U.S.N.M.)



GORGETS, PENDANTS AND PLUMMETS OR CHARMS.

Cat. Nos. 97853, 62578, 97423, 60206, 189381, U.S.N.M. † natural size.

is introduced because of the material, which is porphyritic diabase and comes from Michigan. It has two holes and may have been worn either on the arm or the breast. No. 62578, U.S.N.M., is of soap-stone, and from Tennessee. A third (No. 97423, U.S.N.M.) is of red jasper from east Tennessee. The other two are of slate and show their respective decorations. The sixth specimen of hematite, though classed as a pendant, the justification for which is the little groove around the small end and apparently intended for a string or cord by which it was suspended, belongs to a class distinct from the others. They are always round, are symmetrical, and with all their hardness are made smooth and usually well polished. They have been classed as plummets and charms, as well as pendants. Occasional specimens have a hole drilled through the small end instead of the groove, while others have the lower end made the same as the upper, also grooved or drilled. Archaeologists are far from being agreed as to the use of these implements, the disagreement being indicated by the different names given to them, but all will agree as to the beauty of the specimens and the propriety of classing them as works of art.

Fig. 108 from Norwich, Connecticut, is of greenish gray trap rock, with convex edges. It has one hole drilled near the end as though for suspension from the neck and to be worn on the breast. It has been ground and smoothed all over and is decorated on one side and around the edge by a row of extremely small dots with zigzags of the same. The opposite side is plain.



Fig. 108.

PENDANT, WITH DECORATION
OF ZIGZAG POINTS.

Norwich, Connecticut.
Cat. No. 17905, U.S.N.M. $\frac{1}{2}$ nat-
ural size.



Fig. 109.

PENDANT, OVAL FLATTENED
PEBBLE WITH DECORATION
OF INCISED LINES.

Tiverton, Rhode Island.
Cat. No. 17596, U.S.N.M. $\frac{1}{2}$ nat-
ural size.

flattened pebble with incised lines as represented.

The great mass of these gorgets and pendants are plain, a few have been scratched with figures which might be hieroglyphs or ideographs, but they are so extremely rude as to be of slight value from an artistic point of view, and so many are of doubtful authenticity that none are presented.

Fig. 109 represents another of these objects which, while evidently used for suspension, may have served in any place. It is from Tiverton, Newport County, Rhode Island. It is an oval,

Chungkee stones.—If the civilization or sociology of the prehistoric man was being presented these objects would be classed with games or athletics, but because of the hardness of the material and difficulty of

manufacture, together with their use as a means of pleasure, if not of ornament, it is not improper to assign them a place here. The United States National Museum possesses an extensive series which, for some unexplained reason, extends into almost every imaginable disk form. Fig. 110 represents a side and sectional view of one of these objects of yellowish brown quartzite. It is drawn half size, and is a large and weighty object. Most of the large specimens are of quartz, either yellow or white. They are disk form, the edges are rounded, the center on both sides has been cut out and made cup-shaped. He who could make this object, accomplishing all these requirements from an irregular piece of rude, hard quartz, and produce a specimen of such regularity of form and correctness of design must have been an artist of considerable experience. For, be it understood, that in this, as well

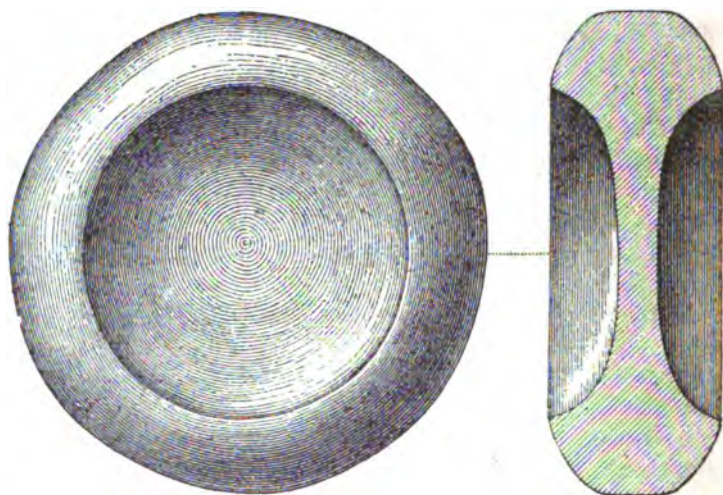


Fig. 110.

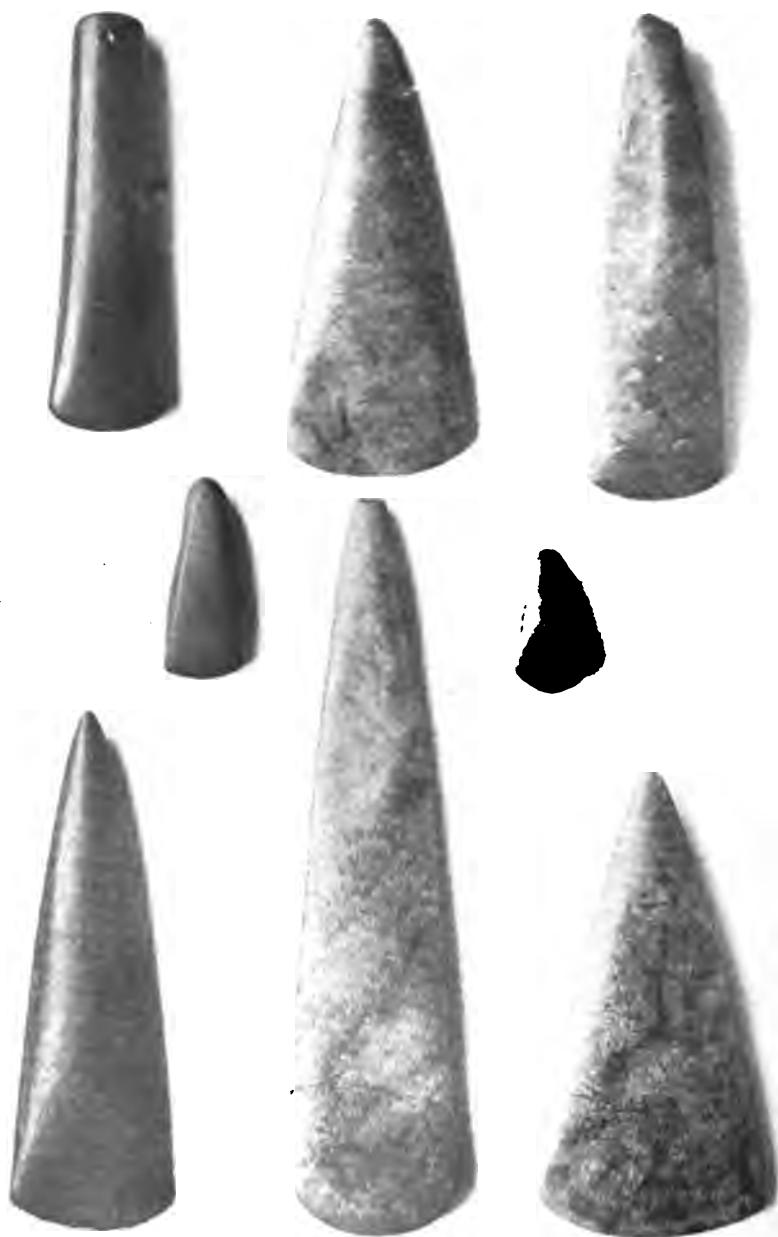
CHUNOKEE STONE, SIDE AND SECTIONAL VIEWS. YELLOW QUARTZ.

McKenzie, Carroll County, Tennessee.

Cat. No. 34513, U.S.N.M. $\frac{1}{2}$ natural size.

as in all foregoing objects, the work was done by hand, and only with the usual tools for hammering, pecking, grinding, smoothing, and polishing. It has been suggested that these may have been made with the lathe, but an investigation shows this not to have been so.

Beads.—Beads of jasper are not infrequently drilled, and the United States National Museum possesses some jasper pieces of extraordinary length—for example, 3 inches—less than $\frac{3}{8}$ inch in diameter, and a hole half the thickness of the bead drilled through its entire length. This hole is put exactly through the center of the cylinder, without apparent enlargement or smoothing, as though it had been drilled from one end only, but whether done this way or drilled from both ends the delicacy of the work and the precision with which it was done, when remembered to have been the work of a savage, is marvelous.



SERIES OF EUROPEAN PREHISTORIC POLISHED JADE HATCHETS.

U. S. National Museum. $\frac{1}{2}$ natural size.



SERIES OF EUROPEAN PREHISTORIC POLISHED JADE HATCHETS.

U. S. National Museum. $\frac{1}{2}$ natural size.





SERIES OF POLISHED AND GROOVED ACTINOLITE AXES AND HAMMERS,
FROM THE PUEBLOS OF NEW MEXICO AND ARIZONA.
U. S. National Museum. $\frac{1}{4}$ natural size.

LAPIDARY WORK.

JADE AND HARD STONE OBJECTS.

There are many specimens classed as polished stone hatchets, because of the similarity of form, material, mode of manufacture, and use; and yet, because of their rude character and rough appearance, they are not works of art. But some of these implements of hard and semi-precious stones, from purity of form, difficulty of fabrication, and their fine and beautiful finish, may be justly classed as works of art. These are mostly polished hatchets of some of the varieties of jade. Plate 34 represents a series of these magnificent implements from various prehistoric stations in western Europe.

Jade is remarkably hard and tough. The latter quality is said to be produced by the arrangement of its fibers in small interlaced bundles. It is and always has been regarded in China and the oriental countries as one of the precious stones, its hardness and the difficulty of working having conspired to greatly enhance its reputation. Except a single piece only partially determined, lately found in Austria, none of the raw material has ever been discovered in western Europe, yet prehistoric implements of this material have been found throughout western Europe amounting to many thousands, Lake Constance, Switzerland, alone having furnished 2,000 specimens. This material and its use in prehistoric times opens many abstruse questions concerning migrations of primitive peoples and of the possible extent of their commerce. The most of these implements found in the Swiss lake dwellings are of jadeite, of which the component parts are: Silica, 58 to 60 per cent; aluminum, 22 to 26 per cent; soda, 10 to 12 per cent; with a specific gravity of 3 to 3.3. It is extremely hard, ranking 8 or 9 in the scale of which the diamond is 10.

The same material is found manufactured into implements of the most elaborate and difficult kind in great profusion in Mexico and Central America. Plate 35 shows specimens thereof. These are all in the United States National Museum. Their locality, appearance, or use need not be described; it will be sufficient to say that they belong to the prehistoric period in Mexico and Central America.

Fibrolite, still another variety of jade, is confined to southern and western France. It is composed of: Silica, 34 or 35 per cent; aluminum, 63 to 65 per cent; with a specific gravity of 3.2 to 3.3.

Actinolite, still another variety, is composed of: Silica, 0.60; magnesia, 0.21; lime, 0.14 per cent; with a specific gravity of from 3 to 3.1. Its distribution is throughout the Pueblo country of Arizona and New Mexico. The specimens shown in plate 36 are these actinolite grooved axes and hammers from that locality, and belong to the National Museum.

Nephrite is still another specimen of jade, the component parts of which are: Silica, 56 to 58 per cent; magnesia, 20 to 22 per cent; lime,

11 to 14 per cent; oxide of iron, 5 to 8 per cent, and aluminum, 1 to 3 per cent; with specific gravity 2.9 to 3.

A profusion of prehistoric implements, principally axes or adzes made of nephrite, have been found from the Straits of Fuca northward along the entire coast of British Columbia and the northern end of Alaska. (Plate 37.)

Pectolite is composed of: Silica, 54; lime, 33; soda, 9 per cent; with a specific gravity of 2.7 to 2.9. It is found among the Eskimos and the Indians on the northwest coast of North America. Its principal service is as a hammer, for which use it is prepared with a withe and lashed to a wooden handle (Plate 37), and as an evidence of the almost universal art instinct of prehistoric man, this hammer, which might have been only a rough stone in every part except its face, has, despite its hardness and the difficulty and tediousness of the work, been pecked or hammered into a symmetrical form and then ground or polished to a smooth and regular surface, as though this were required for utility.

The finding of two partly worked bowlders of nephrite on the lower part of the Fraser River, at Lytton and Yale, British Columbia, respectively, and the discovery of unfinished objects in old Indian graves near Lytton, make it certain that the manufacture of adzes had been carried on there.

A series of specimens, numbering sixty-one in all, have been deposited in the Museum of the Geological Survey, at Ottawa, and in the Redpath Museum, McGill College, Montreal. These consist of both nephrite and pectolite implements, as adzes, drills, axes, etc. Of the sixty one objects found, seventeen show that they have been sawed from other pieces. A prolific source of supply of this mineral in primitive times, now known as Jade Mountain, is situated about 150 miles above the mouth of the Kowak River, in Alaska. The world is indebted for the discovery of this mountain to Lieut. G. M. Stoney, United States Navy, who has brought down, and presented to the United States National Museum, quite a number of specimens. Plate 38 represents sundry of the pieces, some water-worn bowlders and fractured fragments of the material, accompanied by two or three manufactured specimens. This is the only known source of supply of this mineral in America.

Migration.—When implements are found which, upon analysis, contain the foregoing component parts and are determined to be of this mineral, it raises a fair presumption that they came from this source of supply, and is presumptive evidence of prehistoric communication, if not migration, between the peoples. This is true only to a certain point, and is not susceptible of universal application. It does not follow that all nephrite objects came from Jade Mountain.

Jadeite is an entirely different mineral from nephrite or any of the varieties of jade, and must, or at least may, have had a different place of origin and come from a different direction.



SERIES OF POLISHED NEPHRITE AXES AND ADZES (ONE PECTOLITE HAMMER),
FROM ALASKA.

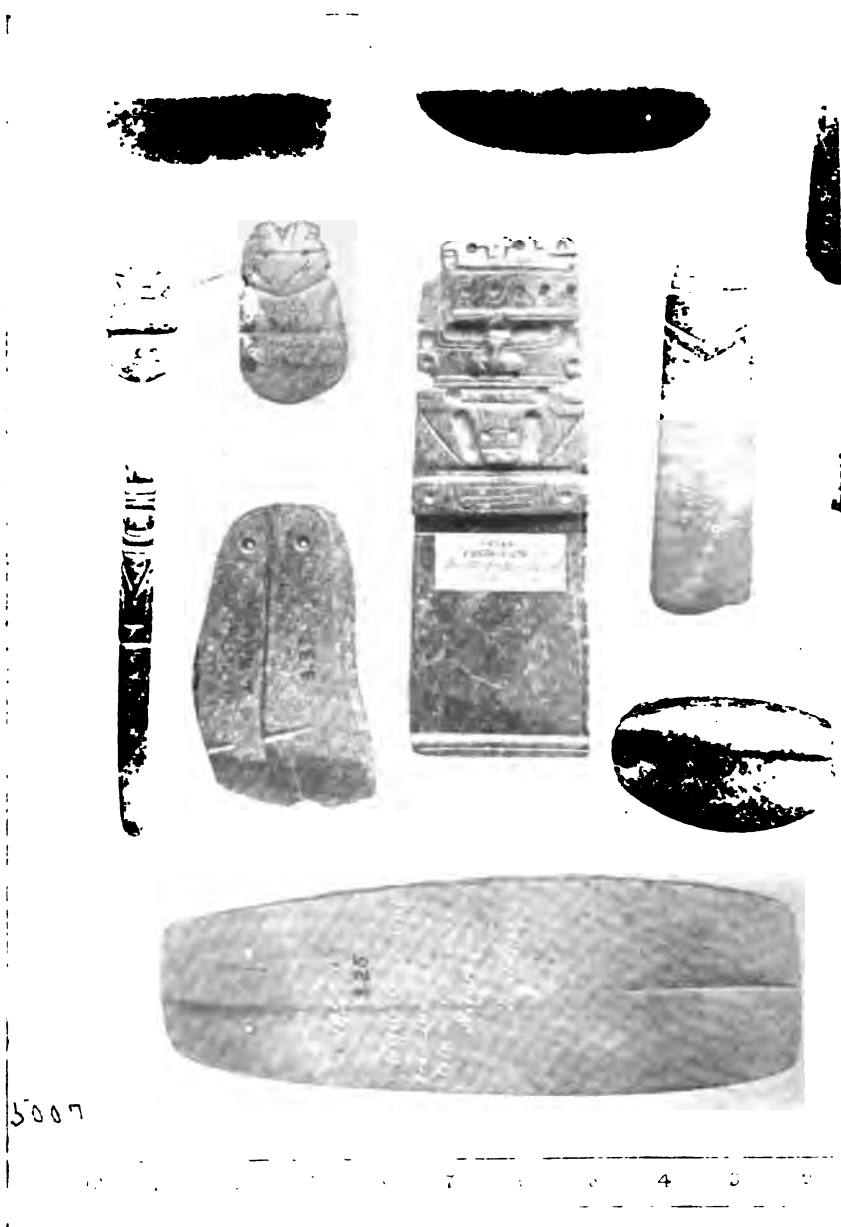
U. S. National Museum. $\frac{1}{2}$ natural size.



SERIES OF NEPHRITE BOWLDERS AND FRAGMENTS THEREOF FROM ALASKA, DISCOVERED BY LIEUTENANT STONEY, UNITED STATES NAVY.
U. S. National Museum.







SERIES OF POLISHED, WROUGHT, AND SAWED STONE OBJECTS OF SEMIPRECIOUS CHARACTER, PRINCIPALLY JADEITE, FROM CENTRAL AMERICA.

Obverse and reverse views of same objects.

U. S. National Museum. $\frac{1}{4}$ natural size.

The latest effort was that made by Mr. A. Sjogren, a learned Scandinavian geologist interested in prehistoric anthropology, acquainted with the importance of the "jade question," and always on the lookout for any evidence that would shed light thereon. He resided for a time in Costa Rica, with full opportunity for the investigation of and acquaintance with the jadeite objects in that country. During his visit there he made more or less extensive searches for the evidence of indigenous jade. He found a number of pebbles the appearance of which suggested that they might be the desired material. On his return to his native country he stopped at Washington, and, visiting the United States National Museum, he invoked the aid of Professor Merrill, Curator of Geology and Mineralogy, and the author, as Curator of Prehistoric Anthropology, who opened the cases in his department and produced implements from Costa Rica and the neighboring countries for comparison with the specimens brought by Mr. Sjogren. The result was that eight specimens of pebbles were selected as having the greatest similarity with the material of the jade implements, and it was proposed to put them to test of microscopic investigation. Professor Merrill accordingly made thin sections of these for that purpose, and has just reported the result of his investigations. He says:

Nos. 1, 3, and 8 are without doubt an altered pumiceous tuffa, identical with No. 59899, described by Professor Clarke and myself in our paper in *Proceedings of the United States National Museum*, Vol. XI, page 127.

This specimen (No. 59899, U.S.N.M.) was from San Huacas, Costa Rica, dark green, not mottled, soft, specific gravity 2.282, and its composition as follows:

Ignition	10.39
Silica	70.49
Alumina.....	11.39
Ferrous oxide.....	2.39
Manganous oxide	Trace.
Lime	3.83
Magnesia .....	.57
Alkalies.....	Undetermined.
<hr/>	
Total.....	99.06

A microscopic examination shows that the mineral is evidently a highly altered volcanic tuff, but very difficult to make out. The mass of the rock is made up of a greenish-gray amorphous felt, through which are scattered round bunches of a bright-green chlorite and small, colorless points and elongated crystals, which may be felspathic, although they are too small to show twin striae. There are also occasional colorless elongated and curved shreds, which are wholly without action in polarized light, and which are doubtless glass.

He continues as to the Sjogren specimens:

Nos. 2, 4, 5, and 7 are highly siliceous rocks of rather obscure nature, but consisting largely of chalcedonic silica, and if not true chalcedonic secretions, are at least very compact fragmental rocks that have been acted upon by silica-bearing solutions. No. 7 shows occasional minute circular areas with concentric structure,

which are doubtless silicified remains of foraminifera, such as are not infrequent in siliceous nodules found in limestone. There is nothing in the series in the least resembling true nephrite or jadeite.

The concluding sentence leaves the discovery of the origin of jade material, of which the Costa Rica prehistoric implements were made, as much an unsolved problem as ever. But negative results from the searches of an experienced geologist made on the spot are of more value than has been generally admitted, and the thanks of prehistoric anthropologists are due to Mr. Sjogren for his interest and efforts. It is certainly remarkable that, with the thousands of prehistoric implements from Mexico and Central America, no specimens of the natural material has ever been found in any of those countries.

There are other views which seem to narrow the question of jade migration, if they do not elucidate it. It would appear highly improbable that any such migration of peoples could have been made by land between the place of origin in Burmah and the place of its discovery in Mexico and Central America. We can scarcely conceive of a migration, comprised of however great or small numbers, which would start from Burmah overland by way of Bering Straits for Mexico and Central America, carrying with them such small implements and in such great numbers. If they did, these implements would run great risks of being lost. Arrived in Alaska, the emigrants ought to have found some traces or specimens of the nephrite, wrought or unwrought, of which we now find so many. One or two hypotheses force themselves upon us: The emigrants (from Burmah) might have left some of their own jadeite implements in Alaska or obtained some of the nephrite. No traces have been found of either. Then these emigrants would have started on their southwestern trip, a distance of several thousand miles, to Mexico, without leaving anywhere any trace of jadeite implements. Arrived at Mexico, and thence on through Central America, are to be found implements, all of jadeite, by the thousand, but none of nephrite. If these emigrants traveled by land from Burmah to Mexico, crossing at Bering Straits, it would involve a long and necessarily tedious journey. In Alaska these emigrants would enter a country where there was a mountain of this precious mineral, the prehistoric inhabitants of which well knew how to make it into implements. No other implements or objects, of this or similar material, have been found along the indicated route which would serve as extraneous evidence of such migration.

The foregoing argument seems satisfactory to the author against a migration of jade or jade implements by land from Burmah to Mexico or Central America. This leaves only the ocean as a means of migration, and that such a journey should have been voluntarily made across such an ocean seems almost incredible. It would appear, in view of the difficulties and obstacles to such journeys or migrations, either by land or sea, that the only course left to deal with the jade question is to await further developments and discoveries.

It is not intended in this paper to pursue the question of jade from a mineralogic or an archæologic point of view. Anyone desiring to do so is referred to the works of Professors Meyer, of Dresden; Fischer, of Freiburg; Damour, of Paris; "Nephrite and Jadeite," by Professors Clarke and Merrill;¹ "The Occurrence of Jade in British Columbia,"² by Dr. Dawson, and to "Gems and Precious Stones,"³ by Mr. George F. Kunz, it being the intention of the author to confine his discussion to the art side of the question; and from this side he refers with approbation to the forthcoming edition de luxe of the volume on jade by Mr. H. R. Bishop, of New York City.

Mr. Kunz, the gem expert with Tiffany & Co., in his work, "Gems and Precious Stones,"⁴ speaks of the ancient lapidary work as follows:

The chipping of an arrow point, the grinding and polishing of a groove in an ax head, the drilling of a bead or tube or an ear ornament, all are done by the application of the same lapidarian methods that are practiced to-day by cutters of agates or precious stones. The cutter of to-day, with a hammer, chips into shape the crystal or piece of agate before it is ground; and there is little difference between the ancient method of drilling and that of the present. The stone bead of ancient time was drilled from both ends, the drill holes often overlapping or not meeting as neatly as by the modern method of drilling from one end.

The old way of drilling is still practiced in the east, where the primitive bow drill is used by lapidaries to-day precisely as it has been used by savage tribes in all quarters of the globe, though producing at different periods different qualities of work. Nowhere was its use better understood than in ancient Greece and Rome, where, by its means, were engraved the wonderful intaglio and cameos which now grace our museums, and which have never been surpassed in any period of the world's history. For the special use of gem engraving, the bow drill has been replaced by a horizontal lathe, which, however, does not allow the freedom of touch or deftness of feeling which artists attained by use of the bow drill. The instrument known as the dental drill is really an improved form of bow drill, working much more rapidly. An S. S. White dental engine, provided with a suitable series of drill points, answers every purpose, and has been found especially useful in exposing fossils and minerals when covered with rock, the objects being opened with great rapidity, with little danger of injury. As shown by the author in a paper on a new method of engraving cameos and intaglios,⁵ an artist could be so trained to the use of this improved bow drill as to attain the same softness and feeling developed by the old lapidarian masters.

In the ancient specimens of work, tubes from which a core has been drilled out by means of a reed and sand, revolved by the hand, were done as neatly as anything can be done, the reason being that the object was entirely drilled from end to end. This method of drilling is still practiced, except that the hollow reed is replaced by the diamond or steel drill. When a valuable stone is being drilled, a sheet of steel or thin iron tube is substituted for it. The polishing and grinding now is done on rapidly revolving disks, horizontal or lay wheels, as they are called, whereas formerly the slow process of rubbing with the hand or board or leather was perhaps resorted to. No lapidary can do finer work than that shown by the obsidian objects

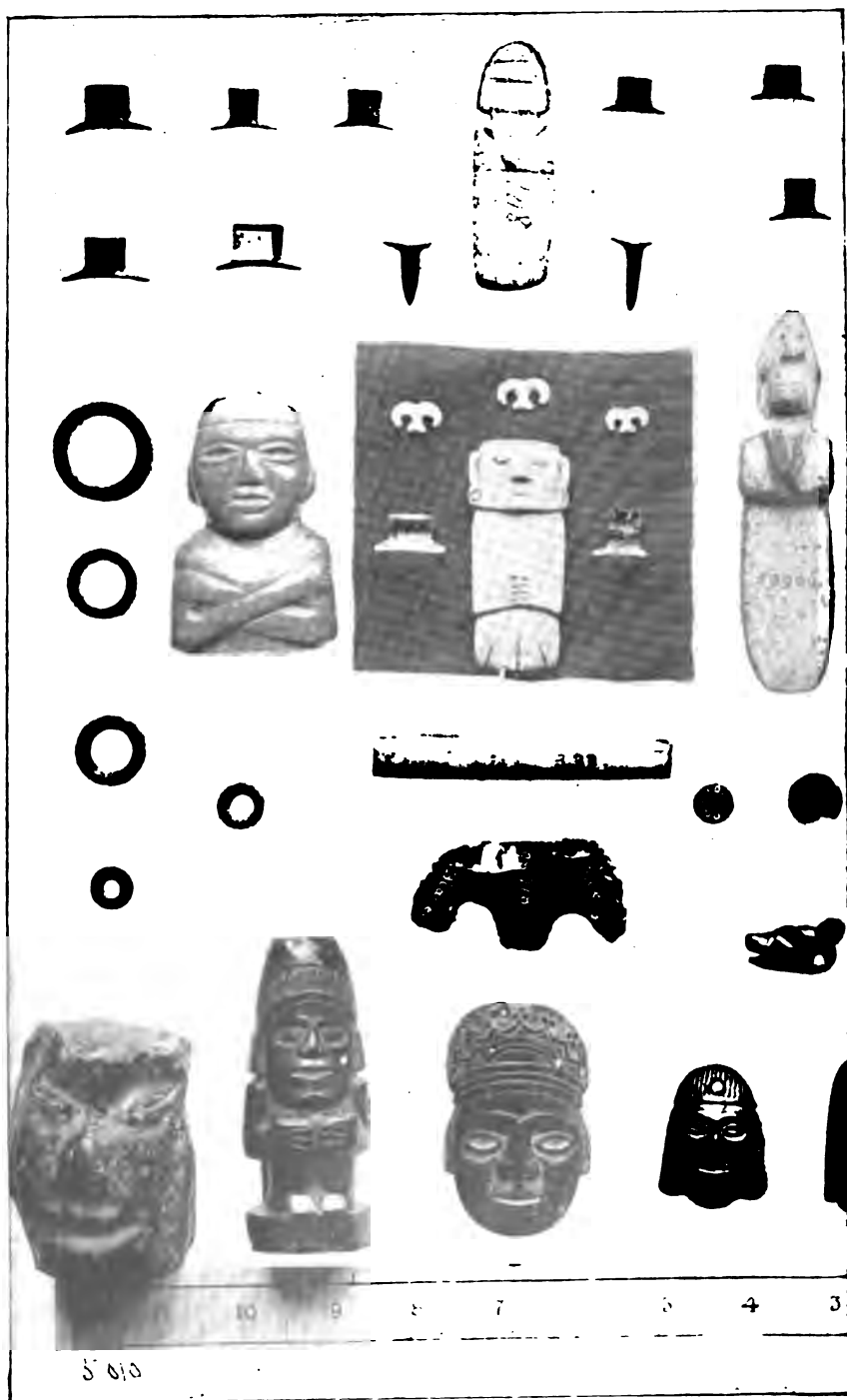
¹ Proc. U. S. Nat. Mus., 1888, p. 115.

² Canadian Record of Science, II, No. 6, April, 1887.

³ Pages 266-277 to 284.

⁴ Pages 303-305.

⁵ Trans. N. Y. Acad. Sci., III, p. 105, June, 1884; also Jewelers' Circular, June, 1884.



SERIES OF OBJECTS OF POLISHED STONE, PRINCIPALLY JADEITE AND OBSIDIAN,
FROM MEXICO AND CENTRAL AMERICA.
U. S. National Museum. $\frac{1}{4}$ natural size.

from Mexico (see illustration), the labrets,¹ ear ornaments, and tubes,² which are even more highly polished, though no portion of the latter is thicker than one-thirty-second of an inch. An obsidian coyote head³ in the Blake collection in the United States National Museum is a beautiful ornament, highly polished, and bored throughout the lower part. The spear points and hoes from East St. Louis and other parts of Missouri and Illinois, and beautiful sacrificial knives—notably the immense knife,⁴ 18 inches in length, in the Blake collection of the United States National Museum, and the one in the Ethnological Museum at the Trocadero in Paris—show the greatest skill in chipping.

Many of the aboriginal stone objects found in North America and elsewhere are marvels of lapidarian skill in chipping, drilling, grinding, and polishing. Few lapidaries could duplicate the arrow points of obsidian from New Mexico, or those of jasper, agate, agatized wood, and other minerals found along the Willamette River, Oregon. No lapidary could drill a hard stone object truer than some of the banner stones,⁵ tubes, and other objects made of quartz, greenstone, and granite that have been found in North Carolina, Georgia, and Tennessee, or make anything more graceful in form and general outline than are some of the quartz discoidal stones⁶ found in these same States. These latter objects are often 4 to 6 inches, and occasionally 7 inches, in diameter, ground in the center until they are of the thinness of paper and almost transparent, and the great regularity of the two sides would almost suggest that they had been turned in the lathe. This may have been accomplished by mounting a log in the side of a tree so that it would revolve, and cementing the stones with pitch to the end of the log, as a lapidary would do to-day at Oberstein, Germany, or by allowing the shaft of the lathe to protrude through the side of the log, and cementing the stone to be turned on this. The Egyptian wood turner at work in the Rue de Caire, at the World's Fair, Paris, 1889, might, with his lathe, polish a large ornament of jade or jadeite, like the masks, idols, tablets, and other objects found in Mexico and Central America, or the jade knives from Alaska, in the United States National Museum.

Jadeite masks.—Returning to the discussion of lapidary art as manifested in the working of hard stone, plate 41 shows examples of different materials, form, uses, and localities, though all from Mexico or Central America; some specimens are obsidian, and no distinction is maintained as to the material of the others.

Fig. 111 is a mask of jadeite from an Aztec (?) grave in Mexico. It represents a crying baby. It belongs to Mr. Charles Storrs, of Brooklyn, and was exhibited at the meeting of the American Association for the Advancement of Science in 1879, by Mrs. Erminnie A. Smith. It is reported as having a specific gravity of 3.3, which, with its hardness, determines it to be jadeite. Remarking upon its art, we first see how it has been wrought by drilling and other methods of abrasion into, not simply a representation of the human face, but that it has its peculiar expression. The eyes are closed, the brows are drawn down, the nose and upper lip are drawn up, deep furrows are in the cheeks under the eyes and by the side of the nose, the contour is regular, the profile is correct and true, and besides all this, every portion of the face has been not only smoothed, but finely polished, the depths and sides of the furrows and around the eyes equally well with that of the prominent parts like the cheeks and forehead. Suggestions are made as to how some of this

¹ See fig. 117.

³ See fig. 116.

⁵ See figs. 100-104.

² See fig. 118.

⁴ See fig. 88.

⁶ See fig. 110.

was accomplished, for example, at the corners of the mouth, where the depressions were made by drilling, although the drill marks have been polished out. One is able to speak of this drilling operation with a certainty that becomes absolute, from finding it represented in a score of other specimens, wherein the corners of the eyes and mouth have been drilled, some with a solid, others with a hollow drill, the latter showing the protuberance of the core. Specimens have been found where such drilling had been utilized for the insertion of precious or colored stones. The unscientific reader will appreciate the beauty of this specimen as well as the difficulties to be overcome, when it is stated that with this and many others of the specimens herein men-

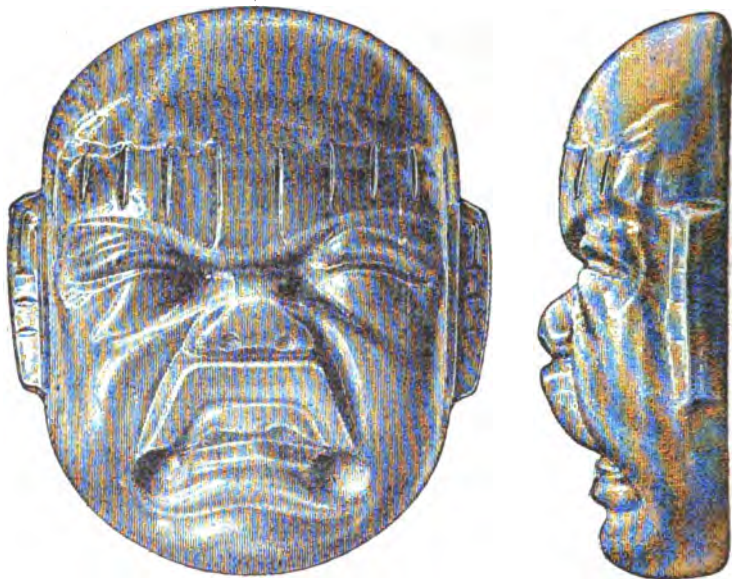


Fig. 111.

"CRYING BABY," A MASK OF JADEITE FROM AN AZTEC (?) GRAVE.

Face and edge views.

Mexico

Cast, Cat. No. 42652, U.S.N.M. Natural size.

tioned one can, without any preparation and without undue pressure, cut the glass in the cases which contain them with apparently as much ease as does the glazier with his diamond. In fact, the material stands next in hardness after the diamond. It is 9 in the scale of which the diamond is 10. These remarks in regard to hardness, drilling, and polishing apply to many of the specimens shown in plates 39, 40 and 41. There are specimens of hard stones not jade which show evidence of fine lapidary art.

Crystal skull.—Fig. 112 represents a human skull of rock crystal. Its hardness is well known. The sutures are shown, the hollow eyes are drilled out, the nose with its processes is shown, and the grinning teeth. A hole has been drilled through from the crown to the foramen

magnum. Other objects in rock crystal treated in a similar manner have been found, of which Mr. Kunz is authority for the statement that the workmanship equals anything done by the modern lapidary. Similar skulls are to be seen in the Trocadero Museum at Paris and in the Douglass collection at the Metropolitan Museum of Art, Central Park, New York. A unique specimen remarkable for its size, from the Boban collection and found in Mexico, is now owned by Mr. George H. Sisson, of New York. It is $8\frac{3}{4}$ inches in length, $5\frac{3}{4}$ inches in width, and $5\frac{1}{4}$ inches in height, and represents a human skull similar in appearance and workmanship to fig. 112. A description of one would stand for a description of the other. Another specimen (fig.



Fig. 112.

REPRESENTATION OF A HUMAN
SKULL IN ROCK CRYSTAL.
Mexico.

Cat. No. 98949, U.S.N.M. Nat-
ural size.



Fig. 113.

REPRESENTATION OF A HUMAN
SKULL IN HARD
STONE, FOSSILIZED
WOOD.

Chichen Itza, Yucatan.

Cat. No. 10631, U.S.N.M.
Natural size.

113) is a skull similar to fig. 112, but of fossilized wood, from Chichen Itza, Yucatan. The eyes are drilled with a hollow drill, the cores protruding as shown in the sketch. The teeth are represented half round or semicircular, instead of being square, as in the other cases. Fig. 114 is a rude block of obsidian 3 inches long, $2\frac{1}{4}$ inches in diameter, from Tezcuco, Mexico, with the rudiments of a human face outlined upon it. The work has been done by abrasion, a piece of obsidian or some other hard stone with the

necessary angles and corners having probably served as a hammer. It is introduced here more as showing the method of procedure than as an object of art in itself. Fig. 115 is a small statuette of obsidian from Mexico, which has been fully completed. It represents a human figure seated; has been worked out to show all the members, and has then been polished as smooth as glass. Fig. 116 is the small head of a coyote or some similar animal. It is worked out in the same way as fig. 115, and is finely polished. Fig. 117 is still another object of obsidian from Mexico, representing a labret, a small hat-shaped instrument used as a lip ornament common to certain primitive peoples—the Alaskans and the Botocudos. Fig. 118 represents a small ring or band of translucent obsidian in the form of a cylinder with horizontally projecting rims. There are other similar specimens in the United States National Museum. Their use is unknown, but they



Fig. 114.

BLOCK OF OBSIDIAN, SHOW-
ING FIRST STAGES OF SCULP-
TURING—A HUMAN FACE
MADE BY HAMMERING OR
PECKING.

Tezcuco, Mexico.

Cat. No. 98949, U.S.N.M.
 $\frac{1}{2}$ natural size.

were probably ornaments. Their peculiar relation to lapidary art consists of the fine workmanship required to reduce them to their extreme thinness. They are only slightly thicker than an eggshell. This specimen is only one out of a series showing the extreme delicacy of the lapidary art with which they were made. Some of them are in the form of cylinders $\frac{7}{8}$ inch in diameter, $1\frac{1}{4}$ inches in length, the hole drilled and enlarged until the body is not more than $\frac{1}{32}$ inch, so thin as to appear almost unable to sustain itself.



Fig. 115.

STATUETTE OF OBSIDIAN,
SMOOTHED AND POLISHED.

Mexico.

Cat. No. 98976, U.S.N.M. $\frac{1}{2}$ nat-
ural size.

New Zealand, where they are made principally of jade or some of its varieties or of some other hard stone; yet similar implements, also of hard stone have been found in Mexico and in the western United States. The United States National Museum possesses a specimen, reported

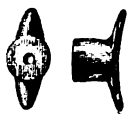


Fig. 117.

LABRET (LIP ORNAMENT) OF
OBSIDIAN, SMOOTHED AND
HIGHLY POLISHED.

Face and edge views.

Mexico.

Cat. No. 27902, U.S.N.M. $\frac{1}{2}$ nat-
ural size.

Patu-patu.—An interesting series of jade objects the manufacture of which bears an intimate relation to lapidary art and about which there has been some discussion is the war club with various names according to the following localities: *Patu-patu*, or *merai*, in New Zealand; *macana* in Mexico, and *slubbets* in Puget Sound and Alaska. They have been made of various materials—hard wood, whalebone, copper, or bronze—but that which most concerns us here is the fact that they were many times made of some of the species of jade or other hard stone.

The greatest number of these implements are from New Zealand, where they are made principally of jade or some of its varieties or of some other hard stone; yet similar implements, also of hard stone have been found in Mexico and in the western United States. The United States National Museum possesses a specimen, reported as having been dug from a mound by Capt. J. B. Aldrich in 1866. The mound



Fig. 116.

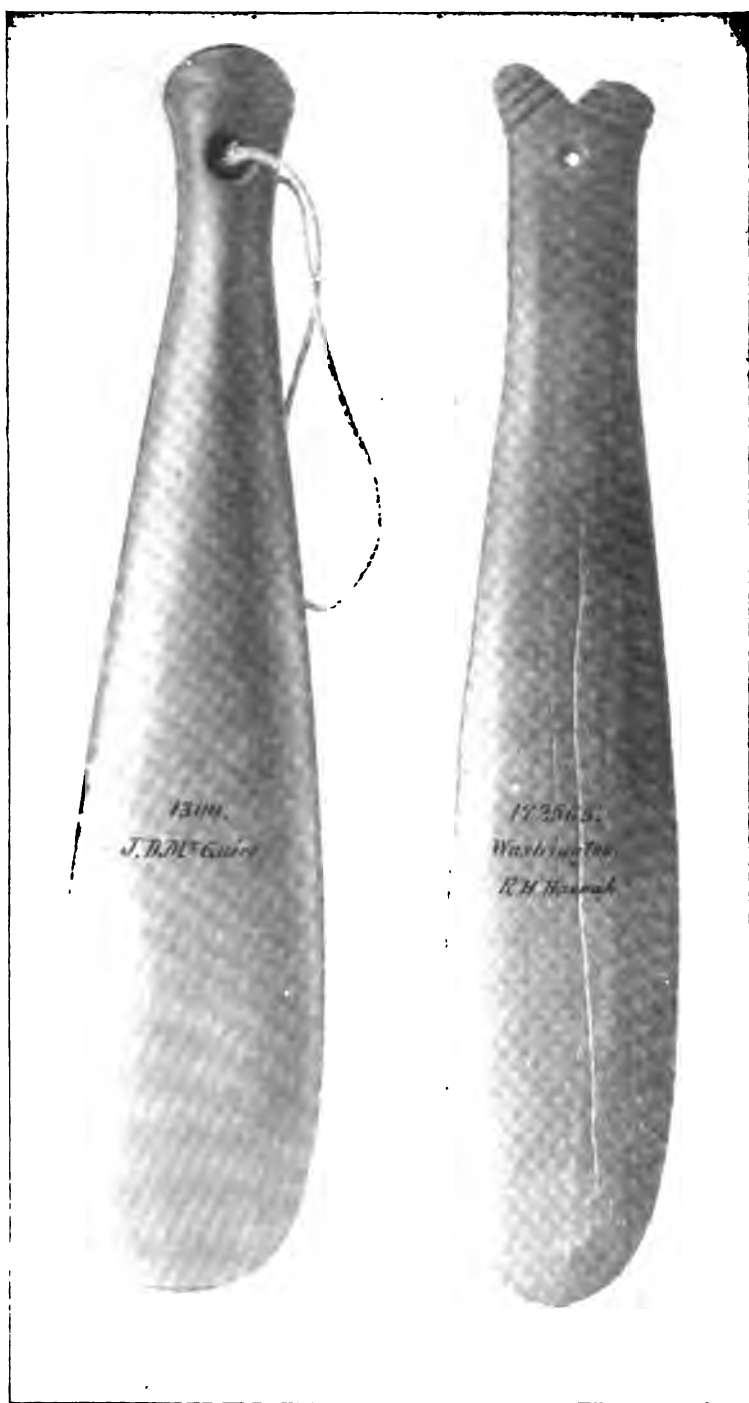
HEAD OF COYOTE, OBSIDIAN,
SMOOTHED AND POLISHED,
PROBABLY A CHARM, DRILLED
FOR SUSPENSION.

Mexico.

Cat. No. 98879, U.S.N.M. Nat-
ural size.

was situated just south of the Arkansas River, near the thirty-eighth parallel, in Bent County, southeast Colorado. Although the report as to the finding of this specimen in Colorado was well authenticated, yet it seemed hardly sufficient to overcome the supposed universal testimony that these peculiar implements belonged to New Zealand. It was believed to be more likely that an error had been made in the report or in the identity of the implement than that an object common to New Zealand should have been unearthed in a mound in Colorado. But further examination puts a different phase upon the affair. Mr. James Wickersham, in a paper entitled "An aboriginal war club," published¹ in 1895, reports the discovery of

¹ The American Antiquarian, XVII, p. 72.



PATU-PATU FROM THE UNITED STATES, SIMILAR TO THOSE FROM NEW ZEALAND.

Cat. Nos. 13100, 172565, U.S.N.M. $\frac{2}{3}$ natural size.

a number of these implements from various parts of the American continent, and an examination verifies the fact and extends the area of their discovery over a much larger portion of the United States. Plate 42 represents two of these implements now in the possession of the United States National Museum in addition to the one received from Captain Aldrich. The best finished one¹ is of the standard shape, size, and appearance, and a reproduction of the Aldrich specimen, as well as many of those from the Pacific coast, from Mexico, and almost all the finished ones from New Zealand, would be but a repetition of this. It is therefore considered useless to duplicate the representation.

The history of the specimen (No. 1300) is given by Mr. J. D. McGuire, the present owner, as follows:

It was given to me by a gentleman who had lived long in the West. The story he told me was, that while on a hunting trip (I think in California, though of this I am not positive) a companion who had left camp in the morning returned with the implement in his hand and said he had found two dead Ute Indians, and to the wrist of one was attached this stone by the piece of cord yet on it.

A specimen from the State of Washington is shown on plate 42 (Cat. No. 172565, U.S.N.M. It was found by Mr. R. H. Hannah, 3 miles east of Olympia, while clearing the ground of stumps. The attention of the author being attracted to the subject, he discovered that the number of specimens found within the United States similar to those in plate 42, especially those like No. 172565, U.S.N.M., has increased considerably and their geographic area greatly extended. In view of this, it has to be admitted that this is an implement of the North American savage; whether historic or prehistoric may be left undecided.²

This art work may not be manifest upon a cursory examination, but it must be considered that many or most of these specimens are some of the varieties of jade, with a hardness equal to that of glass and exceeded only by the diamond, and that they are made straight, true, entirely symmetrical both sidewise and edgewise, with rarely a flaw or defect, and that when thus reduced to form they are smoothed and polished as finely as a piece of jewelry intended for a lady's wear.

SCULPTURE.

EUROPE.

The art of sculpture in Neolithic times had an exceedingly wide range. In Europe it had scarcely an existence worthy the name. As before remarked, the principal ornaments employed during this epoch were



Fig. 118.

RING OR BAND WITH PROJECTING RIM, TRANSLUCENT OBSIDIAN, EXTREMELY THIN AND HIGHLY POLISHED.

Mexico.

Cat. No. 96914, U.S.N.M. $\frac{1}{2}$ natural size.

¹ Loan collection, Cat. No. 1300, U.S.N.M.

² For further argument upon the subject reference is made to Wickersham's paper; to Bancroft's "Native Races," IV, p. 560; and to Prescott's "Conquest of Mexico," III, pp. 82, 87, 99, and 101, plates 25-30.

geometric designs, and representations of living or real objects were rarely attempted. A series of Neolithic ornamentation is shown in plates 19 and 20. These are mostly on pottery, only four being on stone and to be classed as sculpture. There seem to have been two geographic areas in France affecting this kind of art, the first around the Bay of Quiberon, department of Morbihan, the second in the department of the Marne, northern central France.

The four specimens referred to are all from the first-mentioned area. They are on plate 20, figs. 16, 21, 23, and on plate 19, fig. 15.

Plate 19, fig. 15, represents the sculpturing on one of the supports of the dolmen of Petit-Mont, at Arzon. The principal designs or lines are in waves and U-shaped. The only one which could have been intended to represent any known or possible object are two human footprints, and these do not appear to signify anything more than is apparent. Plate 20, fig. 23, represents a cartouche, engraved or sculptured on a support of the dolmen of Pierres-Plates at Lochmariaker, Morbihan. Plate 20, fig. 21, is a representation of one of the supporting stones of the dolmen of Gavrinis. The author has visited this dolmen and has seen the sculptured stones in place. They are thin sandstone slabs, about 6 feet high, 4 feet wide, and form the sides of both the crypt and the entrance, there being probably forty in all, similar in many respects to that shown in

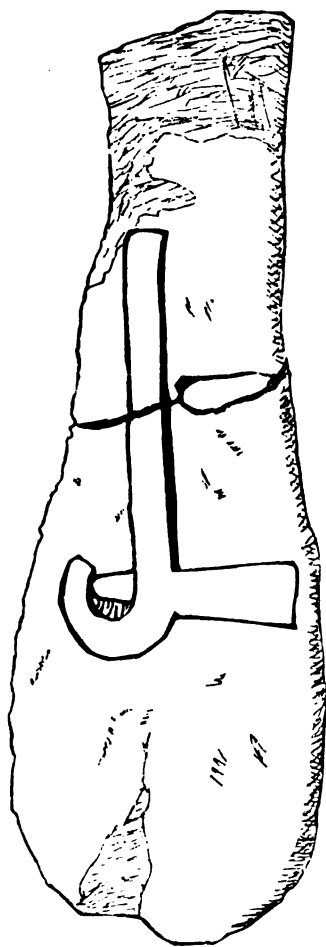


Fig. 110.
GAVRINIS.
FIGURE OF A POLISHED STONE HATCHET WITH HANDLE, ENGRAVED ON SIXTH SUPPORT OF THE DOLMEN OF
‡ natural size.

the figure, although this has been chosen as the best representative. The surface is rough; the sculpturing has been done with the hammer by pecking or battering—*martelage*, the French call it. Plate 20, fig. 10, is a representation of the covering stone of the dolmen at Baker Hill, Rosshire, Scotland, taken from "Archæic Sculpturings," by Mr. J. Y. Simpson. These will be perceived at once to consist principally of cup stones, some with concentric rings, others connected by a slight

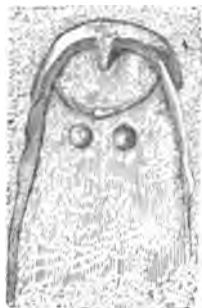
groove. To go into the subject of cup stones as a branch of sculpture would lead us too far afield.¹

Other dolmens have been found with marks made thereon, but no meaning is ascribed to them beyond possibly that of a stone hatchet handled, or some similar implement. Fig. 119 is a representation of one of these stone hatchets handled, engraved on the sixth support of the dolmen of Gavr'Inis. Various petroglyphs have been found on the dolmens in the immediate neighborhood—Tables-des-Marchands, Mané-H'röeck, Kercado, Petit-Mont, Mein-Drein, Be-er-Groah; also on the dolmens of Grosse Perrotte (Charente), and Trou-aux-Anglais (Seine-et-Oise).

M. L. Davy de Cussé made an extensive investigation and report upon all marks and signs engraved or cut on the megalithic monuments, whether dolmens or menhirs, in the department of Morbihan.²

In none of these sculptures has there ever been an attempted representation of living things, except in the few cases mentioned. This statement would have been true for all France until within a few years past, but because of recent discoveries it requires modification. There have been found on some of the stone supports or tables of the dolmens, rude and apparently inchoate or malformed figures which, by assembly and comparison, are decided by investigating archaeologists to have been representations of the human form. Baron Joseph de Baye and M. Adrien de Mortillet have been the most ardent and successful investigators in this regard, though MM. Cartailhac and Reinach should not be forgotten. Fig. 120 represents one of these supports of a dolmen in the department of Marne. Fig. 121 is another from the same department.³

These are believed to have been the earliest prehistoric sculptures in stone or on stone monuments in France. They were bas-reliefs on the



Figs. 120, 121.

RUDE SCULPTURES OF THE HUMAN FORM ON SUPPORTS OF DOLMENS.

Height 4 feet (1).

Marne, France.

Cartailhac, *La France Préhistorique*, figs. 105, 106, pp. 242, 243.

¹Reference is made to the "Contributions to North American Ethnology," V, (U. S. Geog. and Geol. Survey), entitled "Observations on cup-shaped and other Lapidarian Sculptures in the Old World and in America," by Dr. Charles Rau.

²Recueil des Signes Sculptés sur les Monuments Mégalithiques du Morbihan, Vannes, 1865-66.

³Cartailhac, *La France Préhistorique*, pp. 242, 243, figs. 105, 106; Baron Joseph de Baye, *Archéologie Préhistorique*, 1880, plate 1; Solomon Reinach, *l'Anthropologie*, V, p. 22, figs. 14, 15.

supports of the dolmens in the Grottos of Coizard in the valley of Petit-Morin (Marne).

Similar rude sculptures have been found in other parts of France, which have been collated by M. Cartailhac in the work above cited, which collation has been extended in his description of the sculptures of the dolmen d'Epone (Seine-et-Oise).¹

The collation of sculptures of the human form was continued by M. Solomon Reinach.² It is not deemed necessary to here enlarge on the subject in greater detail. Those interested can follow it in the authorities cited.

Plate 43 represents four of a series of eight discovered by Abbe Hermet and drawn and described by M. Cartailhac.³ The figures are the best of the series and have the nearest approach to human beings. Some have legs and feet represented below the girdle, but shorter, narrower, straighter, and closer together, until it becomes an even chance whether they may not have been intended to represent the fringed ends of a scarf. M. Gabriel de Mortillet has reported and figured by photograph the same statues.⁴

M. Solomon Reinach figures and describes the same,⁵ and says: "I find it inexplicable that these should ever have been qualified as Neolithic. The accessories which distinguish them can respond only to an origin in the time of metal, probably of bronze."

Other sculptures near Paris are reported by M. Adrien de Mortillet.⁶

NORTH AMERICA.

Aboriginal sculptures in North America are quite different from those of Europe. The Neolithic peoples of the United States, whether North American Indians or their ancestors or predecessors, made many pieces of sculpture in stone, wood, or pottery, representing animal as well as human faces and forms. Most of these were rude, though they sometimes presented the subject in a bold and marked manner.

In stone.—The sculptures in stone exhibited a skill in art inferior to that displayed in flint chipping, drilling, and polishing. The ordinary decoration of objects was not, as in Europe, confined to geometric designs. It appears as though the aboriginal American artist gave his fancy or imagination free rein, was not hampered by rules of art nor deterred from the most daring attempts by any imaginary mechanical or technical difficulty. It is true that he made designs by sculpturing on flat surfaces, sometimes on stone, but many more times on pottery. Still, on numerous occasions he essayed the highest flights of

¹ L'Anthropologie, 1894, V, pp. 147-156.

² La Sculpture en Europe, pp. 25-34, 172-185, and 288-305.

³ L'Anthropologie, 1892, III, No. 2, p. 222.

⁴ Revue Mensuelle de l'École d'Anthropologie, troisième Année, X, 15 Octobre, 1893, p. 321.

⁵ L'Anthropologie, V, pp. 26, 27, figs. 22, 23.

⁶ Bulletin de la Société d'Anthropologie de Paris.



FOUR STATUES, SANDSTONE, RUDELY REPRESENTING THE HUMAN FIGURE
FOUND IN 1890, AVEYRON, FRANCE.

Average height, 4 feet.

Cartailhac, *l'Anthropologie*, 1892, III, No. 2, p. 222; G. de Mortillet, *Revue Mensuelle de
l'Ecole d'Anthropologie*, October 15, 1893, p. 316.





HUMAN FIGURE, STONE.

Height, 21½ inches; weight, 56 pounds.

Found in 1888 near Stilesboro, Bartow County, Georgia.

Collection of A. J. Powers, Mount Vernon, Iowa.

art, and sought to represent the human form as well as the face, by sculptures done in the round.

Plate 44 represents a human figure sculptured in stone. Its height is $21\frac{1}{2}$ inches, and its weight 56 pounds. It is complete and perfect, without a break or damage. It was found near Stilesboro, Bartow County, Georgia. It is seated, the legs are represented in the solid stone as though crossed, but in an impossible manner, not being more than one-third the length of the arms. The only indications of sex are the *mammæ*, which are small dots, indicating the male. The material is fine-grained sandstone, and the entire figure has been worked out of the solid. It has apparently been done altogether by battering or pecking into form and then rubbed or scraped smooth. It is not polished. The shape of the head and the general appearance of the features are typical, to a degree at least, of the aboriginal art throughout the southern United States. The head rounded over the top of the skull, broad across the middle, with projecting ears; the eyebrows are prominent but made so by the sunken eyes. The eyes are oval, and their orbits on the same plane. The nose is straight, without much appearance of nostrils. The chin is short and rounded, the under jaw very small. The most noticeable characteristic of this specimen, as it is of many others from the same region, and that which would seem more than anything else a local type of human sculpture, is the mouth and the mode of treating it. The mouth is open, being represented principally by a cavity which has been excavated to a considerable profundity. The lips are strong and protrude greatly. They are not divided into upper and lower lips, but are continuous around the orifice so as to form an oval ring, the interior of which is the cavity representing the mouth. Neither the teeth nor the tongue are shown, though a ridge in this specimen might pass for teeth or gums. The neck is fairly well formed; the shoulders are square, but with the arms, are considerably exaggerated in size. The body under the armpits is less than half the width across the shoulders. From the armpits to the legs the body is a solid cylindrical mass of stone, without indication of thorax, waist, or abdomen. The hands and arms, especially the former, are extremely rude, the fingers being only indicated by scratches. The head as is represented, was thrown well back, the chin being somewhat in the air. The upper part of the face as well as the forehead, retreated considerably; the head was short (brachycephalic), though this might have resulted from the action of the artist without being any indication of race. The occiput was furnished with a knot $3\frac{1}{2}$ inches in diameter and $1\frac{1}{2}$ inches elevation. This might represent hair, although there is nothing particular to indicate it. The statue has none of the fillet, as it is called by Professor Thomas, which communicates from the back of the head downward.

Fig. 122 represents a human image of crystalline limestone. It is more than 20 inches in height and weighs 37 pounds. It was dis-

covered in a cave near Strawberry Plains, 16 miles east of Knoxville, Tennessee. The body is rudimentary. The face is fairly well represented and shows the two peculiarities of the sculptures of that southern region, that is, the retreating forehead and the ring-like mouth.

Fig. 123 represents two views, back and front, of a rude sculpture of the female figure. It is of yellowish sandstone, is from Williamson County, Tennessee, and is about 8 inches high. Like the former specimen, the body and head are rude, being little more than indicated.

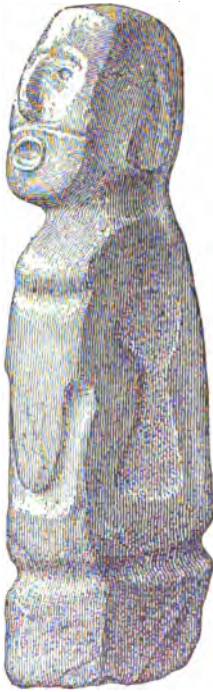


Fig. 122.

HUMAN IMAGE, OF CRYSTAL-LINE LIMESTONE.

Height, 20 inches; weight, 37 pounds.

Cave, Strawberry Plains, near Knoxville, Tennessee.

Cat. No. 6462, U.S.N.M. $\frac{1}{2}$ natural size.

The mammae show it to have been intended for a female figure. The arms are only indicated on the stone and are not separated from the body. The figure is seated or kneeling, the hands upon the knees. The spinal column is prominently indicated. There is the same sloping face and retreating forehead, with the ring-mouth as before remarked.

Fig. 124 is another representation of a female figure, 15 inches high, of yellowish sandstone, from the same locality (Williamson County, Tennessee). The body is much better represented than the former, and as a work of art is more complete and better finished. The figure is kneeling with the hands crossed and pressing against the abdomen. The occiput is provided with a knot through which is a perforation, as though for suspension, although its actual use is unknown.

Prof. Cyrus Thomas¹ published an investigation into the geographic extension in the Southern States, of sculptures with the peculiar fillet extending from the head down the back, and concludes that "the conventionalized form is indicative of local origin." His attention in this regard was first arrested by the examination of a small stone image found in a box-shaped stone grave at Castilian Springs, Sumner County, Tennessee, sent to the Bureau of American Ethnology by Mr. S. S. Bush, of Louisville, Kentucky.

Fig. 125 represents two views of a cast of this image (Cat. No. 175644, U.S.N.M.). It is to be remarked that this image, while it has the retreating forehead, has no semblance of the ring mouth heretofore noticed. Though reported to have been made of stone, the photographs from which these figures were made was a clay model or plaster cast, and the eyes and nose differ widely from the stone images of that locality, being almost exactly like those made of clay and which abound on the pottery bowls and bottle vases.

¹ Amer. Anthropol., IX, December, 1896, p. 404.



STONE STATUE, FRONT AND SIDE VIEWS.

Etowah mounds, Bartow County, Georgia. Original in Tennessee Historical Society collection.

Cast, Cat. No. 61257, U.S.N.M. $\frac{1}{2}$ natural size.

Plate 45 represents two views of a stone statue, a cast of which is in the United States National Museum. The original is in the Tennessee Historical Society collection. The following description is given of this specimen by Col. Charles C. Jones:¹

It was plowed up on Colono Tumlin's plantation (near Cartersville, Georgia), near the base of the large tumulus (Tumlin's Eto-wah Mound). * * * It is a female figure in a sitting posture. The legs, however, are rudimentary and unformed. Its height is 15½ inches, and its weight 33½ pounds. Cut out of a soft talcose rock, originally of a grayish hue, it has been in time so much discolored that it now presents a ferruginous appearance. Below the navel, and enveloping the buttocks and rudimentary thighs, is a hip dress, ornamented both on the left side and behind by rectangular, circular, and irregular lines. The ears are pierced, and the head is entirely bald. In the center of the top of the head a hole has been drilled half an inch in depth, and five-tenths of an inch in diameter. This probably formed the socket in which some head ornament was seated. That ornament, whatever it was, had fallen out and was lost when the image was found. Springing from the back of the head and attached at the other end to the back midway between the shoulders, is a substantial handle by means of which this image could have been securely suspended or safely transported from place to place. The mammary glands are sharply defined and maidenly in their appearance. The ears, hand, and navel are rudely formed. The impression conveyed is that of a dead, young, flat-head Indian woman. Unfortunately the left arm has been broken off, but otherwise this idol is in a state of remarkable preservation.



Fig. 123.

HUMAN STATUE (FRONT AND BACK VIEWS), SANDSTONE.

Height, 8 inches.

Franklin, Williamson County, Tennessee.

Cat. No. 19934, U.S.N.M.



Fig. 124.

STATUE OF FEMALE
FIGURE.

Height, 15 inches.

Yellowish sandstone.
Williamson County,
Tennessee.

Cat. No. 19932, U.S.N.M.

It appears, also, from Colonel Jones, that another statue in the possession of Colonel Tumlin, in 1859, had been plowed up near the same mound. Colonel Jones reported that he saw it, and he gives the following description:²

It was of coarse dark sandstone, and it was 12 inches high. It consisted of a male figure in a sitting posture. The knees were drawn up almost on a level with the chin, the hands resting upon and clasping either knee. The chin and forehead

were retreating, the hair gathered into a knot behind, the face upturned, and the eyes angular. Unfortunately this image was lost or destroyed during Sherman's march through Georgia in 1864.

¹ Antiquities of the Southern Indians, pp. 432, 433.² Page 432.

Plate 46 shows three stone statues, all of which are represented in the United States National Museum by casts. The originals (Cat. Nos. 30251, 30252, U.S.N.M.) are in the Louisville Public Library. They are of sandstone and were found within the State, the precise locality being uncertain. The third statue (Cat. No. 61259, U.S.N.M.) is from the same general locality, but, like the former, the details concerning its finding are unknown. Some of these have been broken, possibly in the original; in others the casts may be imperfect or broken, but enough remains to make it apparent that they were the work of the same class of artists



Fig. 125.

STONE SCULPTURE OF HUMAN FIGURE, FRONT AND BACK VIEWS.
From a stone grave, Castalian Springs, Sumner County, Tennessee.
Height, $3\frac{1}{4}$ inches.

Collected by S. S. Bush, of Louisville, Kentucky. Prof. Cyrus Thomas, *American Anthropologist*, December, 1896, p. 404.

and represented the same peoples. They are alike in their general features, the shape of the head, the chin in air, retreating forehead, rounded skull, the fringe of hair, the broad face, prominent ears, overhanging eyebrows, Roman nose, protruding lips, and ring-shaped mouth. Two of them are females, the third a male. They are all squatting, or possibly only intended to represent the trunk of the human figure. All of them are flat on the bottom and able to sit straight and alone. Fig. 126 represents two views of a stone statue. It is $14\frac{1}{2}$ inches high and is of compact limestone. It is from a mound on Long Island, Roane County, Tennessee, and was excavated by Mr. J. W. Emmert, under



THREE STONE STATUES.

Kentucky.

Originals in Louisville Public Library.

Professor Thomas, of the Bureau of Ethnology. A report of its discovery is in the Twelfth Annual Report of the Bureau of Ethnology, 1890-91, page 359, and it is fig. 240. This statue, like the others, represents only the trunk, and is capable of sitting alone. The arms are outlined with hands on the knee or lap. The peculiarities of the sloping face and receding forehead, with the head thrown back, are mani-

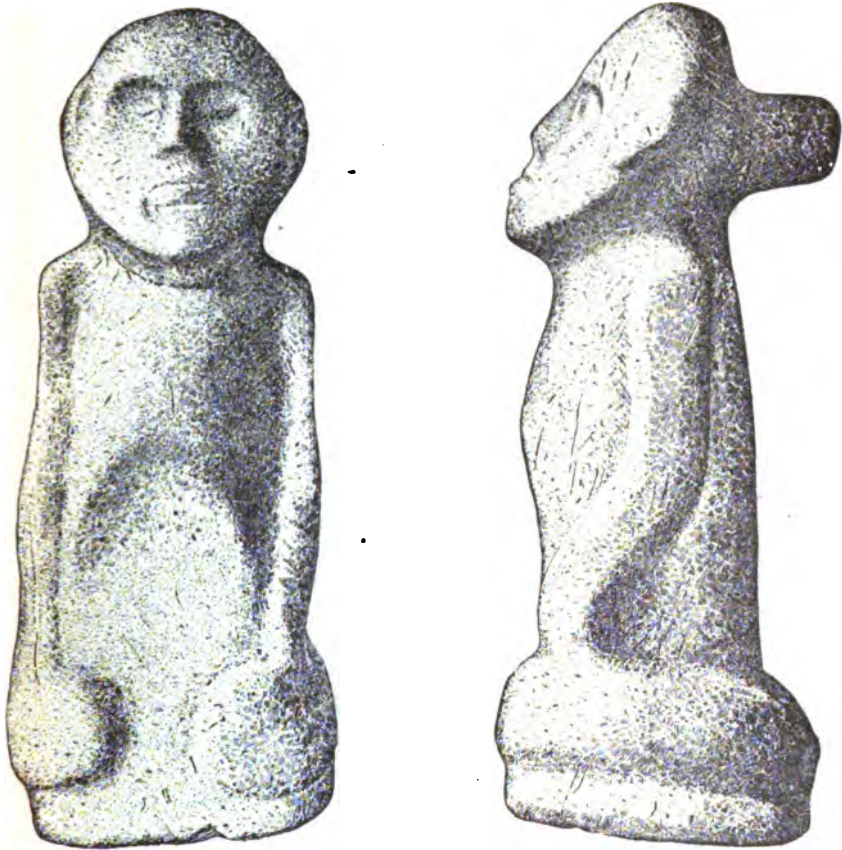


Fig. 126.

STONE STATUE, FRONT AND SIDE VIEWS.

Height, 14½ inches.

Mound No. 3, Long Island, Roane County, Tennessee.

Cat. No. 131781, U.S.N.M. Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890-91, p. 361, fig. 240.

fest at a glance. The sex of the figure is not represented, but the hair (?) shown on the back part of the head is in a firm and solid knot resembling a chignon. There is no appearance of a fillet or attachment to the back. The general character of the individual represented is much the same as the former. The eyebrows are made in the same manner, the appearance of hair around the forehead is the same, and the nose is the same shape, but the ring mouth does not appear.

Plate 47 represents a statue of gray sandstone from Williamson County, Tennessee. It was found by Dr. Frost, of Nashville, and belongs to the collection of the Tennessee Historical Society. It represents a different type of man or a different style of art. The figure is in a squatting or kneeling position, the left knee is brought to the ground, and the figure is sitting on the left foot. The right leg is brought forward, the foot being flat upon the ground, the knee in its natural position, the right arm and body resting on it. All this forms a base by means of which the statue can sit alone. The face is round, moon-like, the eyes much the same, giving it a wild and staring expression. The nose is prominent, but broad and flat, while the lips are protruding and heavy. The workmanship is crude, and it seems doubtful if it was ever intended as a portrait bust or to represent any particular individual or tribe. The entire statue has been wrought out of the solid, and apparently no part of the original surface was ever utilized. It has peculiarities of physiognomy, different from the ordinary appearance of the Indian, and resembles the negro, yet the ensemble of the statue bears no relation to the negro. The appearance of the face resembles somewhat the Perrine statue from Union County, Illinois, made in pottery and represented in fig. 132.

A much mutilated and defaced statue of sandstone was found in a mound in Tennessee and deposited in the United States National Museum by Dr. John E. Younglove, of Bowling Green, Kentucky. The lower part is broken, and its original condition is unknown. Enough of it remains to show the shape of the head, the indication of the hair, the breadth of the face, and that all these are of the same type as the examples from the same locality. The ears are well represented, and are much more elaborate than in any specimen yet examined. This head, if taken alone, would have every appearance of being a boulder, the surface of which had been sculptured as shown, but an examination of the head, taken in connection with the shoulders and breast, shows that it has been worked out of a larger piece. The fracture, both of the trunk and that by which the nose and mouth was destroyed, was ancient, and the broken surface appears to be equally as old as any of the sculptured portion. (Cat. No. 141015, U.S.N.M.)

This statue is peculiar in its appearance and unlike those from the Southern States; the only one bearing any similarity to it which has come to the notice of the author is that shown by Thruston.¹

Other specimens from the region of Tennessee and Kentucky are in private and State or municipal collections in the States mentioned, but enough has been shown to indicate a particular style of sculpture or a certain sameness in its production. Whether this arises from a peculiarity of the artists in that they were all taught one way, or had

¹ "Antiquities of Tennessee," 2d ed., p. 104, fig. 25.



STATUE OF GRAY SANDSTONE.

Height, 18 inches.

Williamson County, Tennessee. In Tennessee Historical Society collection.
Thruston, Antiquities of Tennessee, p. 104.



TWO HEAD-SHAPED VASES. ²

Pecan Point, Arkansas.

(1) Cat. No. 94398; (2) Cast, Cat. No. 94398a. Holmes, Fourth Ann. Rept. Bur. Ethnol., 1882-83, pp. 407-409, figs. 420-423. † natural size.



TWO HEAD-SHAPED VASES, ONE A DEATH MASK, THE OTHER NOT.
U. S. National Museum.
 $\frac{1}{4}$ natural size.

adopted a given style, or whether the individuals represented were alike and had, in fact, the peculiarities of form and feature depicted by the sculptor, is unknown. A critical and extended examination and comparison might furnish means for determination.

The localities where these sculptured peculiarities belong are principally through the southern tier of States, extending from the Atlantic Ocean to the Mississippi River.

In pottery.—It is now proposed to investigate sculpturing, or perhaps the better term is modeling, in pottery. These specimens belong to the same general locality as the stone statues, except that the former seem to cross the Mississippi River and extend to the north into Missouri and Illinois. The first to claim our attention, because of their peculiarity and rarity, are the head-shaped vases or death masks principally from Arkansas. (Plates 48, 49, figs. 129, 130.) Professor Holmes,¹ speaking of these vases, says:

Up to the present time I have met with but eight of the curious head-shaped vases. All were obtained from the vicinity of Pecan Point, Arkansas, and, like other vessels, have been associated with human remains in graves or mounds. It is true that in all cases the bones of the dead have not been found, but this only indicated their complete decay. The question as to whether or not these vases were made exclusively for sepulchral purposes must remain unanswered; there is no source of information upon the subject. Such a purpose is, however, suggested in this case by the semblance of death given to the faces.

The finest example yet found is shown in fig. 420 [our plate 48, fig. 1]. In form it is a simple head 5 inches in height and 5 inches wide from ear to ear. The aperture of the vase is in the crown, and is surrounded by a low, upright rim, slightly recurved. The cavity is roughly finished and follows pretty closely the contour of the exterior surface, excepting in projecting features, such as the ears, lips, and nose. The walls are generally from one-eighth to one-fourth of an inch in thickness, the base being about three eighths. The bottom is flat, and takes the level of the chin and jaws.

The material does not differ from that of the other vessels of the same locality. There is a large percentage of shell, some particles of which are quite large. The paste is yellowish gray in color and rather coarse in texture. The vase was modeled in the plain clay and permitted to harden before the devices were engraved. After this a thick film of fine yellowish-gray clay was applied to the face, partially filling up the engraved lines. The remainder of the surface, including the lips, received a thick coat of dark-red paint. The whole surface was then highly polished.

The illustration will convey a more vivid conception of this striking head than any description that can be given. The face can not be said to have a single feature strongly characteristic of Indian physiognomy. We have, instead, the round forehead and the projecting mouth of the African. The nose, however, is small and the nostrils are narrow. The face would seem to be that of a youngish person, perhaps a female. The features are well modeled, and are so decidedly individual in character that the artist must have had in his mind a pretty definite conception of the face, as well as of the expression appropriate to it, before beginning his work. It will be impossible, however, to prove that the portrait of a particular personage was intended. The closed eyes, the rather sunken nose, and the parted lips were certainly intended to give the effect of death. The ears are large, correctly placed, and well modeled. They are perforated all along the margin, thus revealing a

¹ Fourth Annual Report of the Bureau of Ethnology, 1882-83, pp. 407-410.

practice of the people to whom they referred.¹ The septum of the nose appears to have been pierced, and the horizontal depression across the upper lip may indicate the former presence of a suspended ornament.

* * * * *

It will be well to observe that upon the forehead, at the top, there is a small perforated knob or loop. Similar appendages may be seen upon many of the clay human heads from this valley. A Mexican terra-cotta head now in the museum at Mexico has a like feature, and, at the same time, has closed eyes and an open mouth.

* * * * *

All of these heads, including also some of those in the National Museum, are much alike in conception and execution.

This fact will be forcibly impressed upon the mind by a study of fig. 423 [our plate 48, fig. 2], which represents a specimen recently exhumed at Pecan Point by agents of the Bureau of Ethnology. In size, form, color, finish, modeling of features, and expression this head closely resembles the one first described. The work is not quite so carefully executed, and the head has probably not such pronounced individuality. The curious device that in the other examples appeared near the left eye here occurs on both sides. The lower part of the face is elaborately engraved. Three lines cross the upper lip and cheeks, reaching to the ear, a band of fret-like devices extend across the mouth to the base of the ears, and another band filled in with oblique reticulated lines passes around the chin and along the jaws. The ears are perforated as in the other case, and the septum of the nose is partially broken away as if it had once held a ring. A perforated knob has occupied the top of the forehead as in the other case. The face is coated with a light yellowish-gray slip, and the remainder of the surface is red.

Mr. F. S. Dellenbaugh, who combines the archæologist with the artist, has published² some observations and conclusions concerning this specimen (plate 48, fig. 2). He begins his paper with the declaration, conceded as true, that the North American aborigines have not been successful in depicting the human face. It might be added that they have been no more successful in depicting the human form. He then declares that the excellence of these two or three specimens is far beyond the ability of the aboriginal sculptor as shown in all other specimens, and gives it as his opinion that these were death masks.

Soft clay was pressed upon the dead features, and when sufficiently dry it was removed and other soft clay thinly pressed into the mold obtained. The mask thus made was built upon until the jar was completed.

He declares Mr. Holmes's theory of a free-hand sculpture to have been an impossibility. He thinks it to have been taken in the manner suggested from "a young redskin somewhat distorted by disease and death. The age might be anywhere from 10 to 16, if a male, and 14 to 20 if a female." He is of opinion (again differing from Mr. Holmes) that the perforations through the knob on the forehead, and those in

¹Some of the tribes on the Northwest Coast have a custom of perforating the rim of the ear in a manner similar in appearance to these. Strauds of red woolen yarn are drawn in and tied, which hang almost to the waist. Models of these are in the American Museum of Natural History, Central Park, New York. It is not suggested that there was any relation between the two.

²Amer. Anthropol., February, 1897, X, p. 49.

the rims of the ear, were intended for suspension. He gives comparative measurements of one of these vases with two white boys, a white man and woman, and shows the general accuracy of size, form, and feature.

Plate 49, figs. 1, 2, represents two of these head-shaped vases, one of which appears to be a death mask and the other not. They belong to the Morris collection, and were on display at the Tennessee Centennial Exposition, Nashville, 1897, where the author obtained a photograph. Fig. 127 *a, b*, represents a head-shaped vase, front and profile views, believed to be a death mask. It was found by Mr. C. W. Riggs while excavating a mound on the St. Francis River, Arkansas. The features are represented in a natural manner, such as is not known in free-hand sculpture. The decorations of the face, like the foregoing illustrations, have been done after the withdrawal of the clay from the mould. The

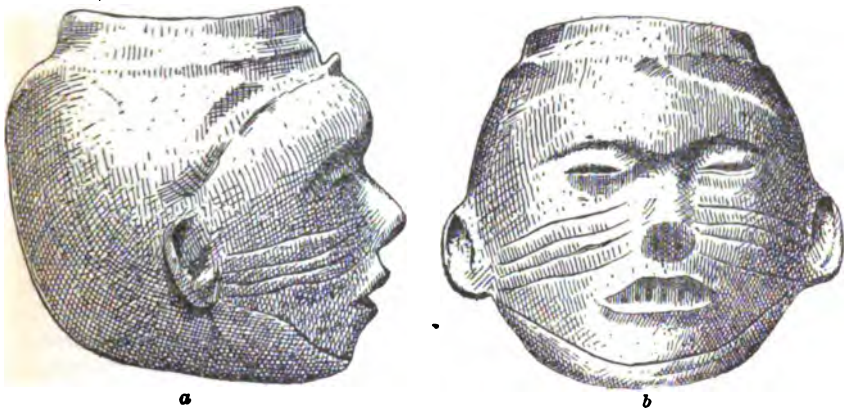


Fig. 127.

HEAD-SHAPED VASE DEATH MASK. FRONT AND SIDE VIEWS.

Thurston, *Antiq. Tenn.*, 2d ed., 1887, p. 94, fig. 20. $\frac{1}{2}$ natural size.

eyes have been slightly opened, the nostrils and teeth are represented by incisions impossible to have been made before, and the same is true with the decorations on the cheeks and with the ears. Fig. 128 is a head-shaped vase, not a death mask, of the red pottery of Arkansas. It was obtained from a mound in the vicinity of Little Rock, and forms part of the collection of Mr. Thibault. The United States National Museum possesses another head-shaped vase (Cat. No. 91299) similar to fig. 128 but still smaller.

These head-shaped vases divide themselves into two distinct groups. The specimens forming the first group are death masks, as becomes more and more evident the more the objects are studied; the other group, while of the same general form as the first, the human head being represented, has the face and features wrought upon it free hand, as in sculpturing, without the aid of a mold or cast. The author does

not pretend to any special knowledge on this subject, but believes that a comparison between these two groups will show the correctness of these conclusions.

The next to be noticed are from the same general locality, and are what have been called "effigy bottles." Professor Holmes¹ makes the following observations concerning them:

These aboriginal potters dealt with the human figure in a bold manner for savages. They were evidently capable of representing many creatures with accuracy, but



Fig. 128.

HEAD-SHAPED VASE.

Pecan Point, Arkansas.

Cast, Cat. No. 87721, U.S.N.M. Holmes, Fourth Ann. Rept. Bur. Ethnol., 1882-83, p. 410, fig. 484. $\frac{2}{3}$ natural size.

preferred grotesque or conventional forms. A man or a woman is generally modeled with a large body and a curious hunched back, the vertebrae appearing along the prominent ridge. The shoulder blades are usually shown with anatomic distinctness, if not with precision; the arms are long and slender, and the hands rest upon the knees or sides. The position assumed is mostly that of kneeling or squatting, the feet being doubled up beneath and united with the bottom of the vessel. These effigy vases are numerous and greatly vary in size and color. They are mostly of the dark red, or in red and white figures, some of which represent parts of the costume, others emblematic devices. * * *

The knees, calves, ankles, and various parts of the feet are indicated with an approach to accuracy. The bottom of the vessels are flat, so as to enable them to stand alone, and the legs modeled in low relief are shown thereon.²

Fig. 129 represents an effigy vase from Arkansas. The general position of the body will be understood by an inspection of the figure. The mouth of the bottle is at the back of the head. One is to remark the peculiar representation of the face and features, and their similarity with some of those already described. The head is thrown back as in the foregoing, the chin is in air, while the features, nose, eyes, and mouth are much the same. Fig. 130 represents another effigy bottle, also from Arkansas, bearing the same peculiarities. Both these have the retreating forehead, the round face, broad and high cheek bones, the framing of hair around the edge of the forehead—in fact so great a similarity in all these little things as to indicate the same

¹ Fourth Annual Report of the Bureau of Ethnology, 1882-83, p. 423.

² Idem., fig. 453, a, b, c, p. 425.

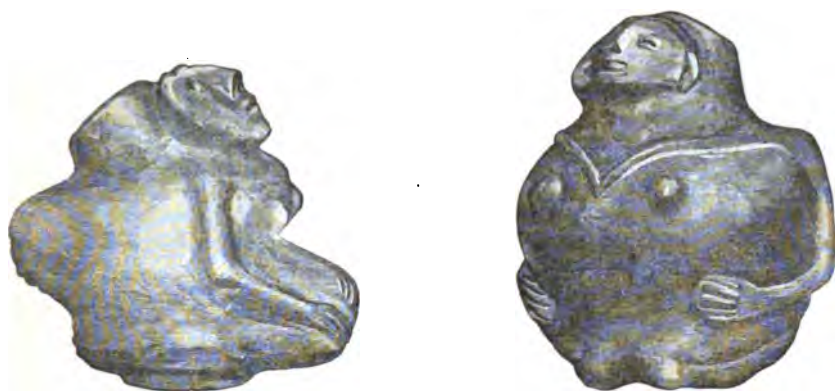


Fig. 129.

EFFIGY BOTTLE, FRONT AND SIDE VIEWS.

Arkansas.

Holmes, Fourth Ann. Rept. Bur. Ethnol., 1882-83, p. 426, figs. 454, 455. $\frac{1}{2}$ natural size.



Fig. 130.

EFFIGY BOTTLE.

Arkansas.

style of art and the same method of representing the human face and form.

Plates 50 and 51 are further representations of the human face and form in these effigy bottles. They all come from Tennessee, and show the various styles of bottles and types of the pottery sculptures of the human face. The human form is not supposed in these to be accurately represented, but is highly conventionalized in order to accommodate itself to the utilitarian purpose of the bottle. These all come from stone graves in Tennessee, and most of them from the neighborhood of Nashville, and are represented one-third actual size.

Another style of pottery vessel belonging to the same geographic area, though extending farther north, is the bowl with a handle representing a human or animal form. One of these (fig. 131, two views) was dug from a mound in Marshall County, Iowa. Although the face is grotesque, the nose being exaggerated, yet it bears the family resem-



Fig. 131.

POTTERY BOWL, FRONT AND SIDE VIEWS. HANDLE REPRESENTING HUMAN HEAD.

Mound, Marshall County, Iowa.

Ca. No. 173688, U.S.N.M. $\frac{1}{4}$ natural size.

blance; the head is thrown back, chin in air, retreating forehead, the high cheek bones, the eyes and mouth made in the same way as the other pottery effigies, and generally the similarities are such as to identify them with the same style of art.

The author has avoided, so far as possible, any reproduction from Professor Holmes's work on Art in Pottery, and it is not intended to go into this subject. The foregoing have been introduced in order to call attention to the peculiarities of the human face throughout this geographic area, whether in stone or on pottery. Many other examples might be cited and copied if required.

DIFFERENT AREAS AND STYLES.

We now pass to a different style of sculpture, still aboriginal, but belonging to a different geographic area, the center of which might be indicated generally as Illinois. Fig. 132 represents a statue taken from



A SERIES OF EIGHTEEN EFFIGY BOTTLES FROM STONE GRAVES, TENNESSEE,
REPRESENTING THE HUMAN FACE.

General Thruston's collection, Nashville, Tennessee.

$\frac{1}{2}$ natural size.

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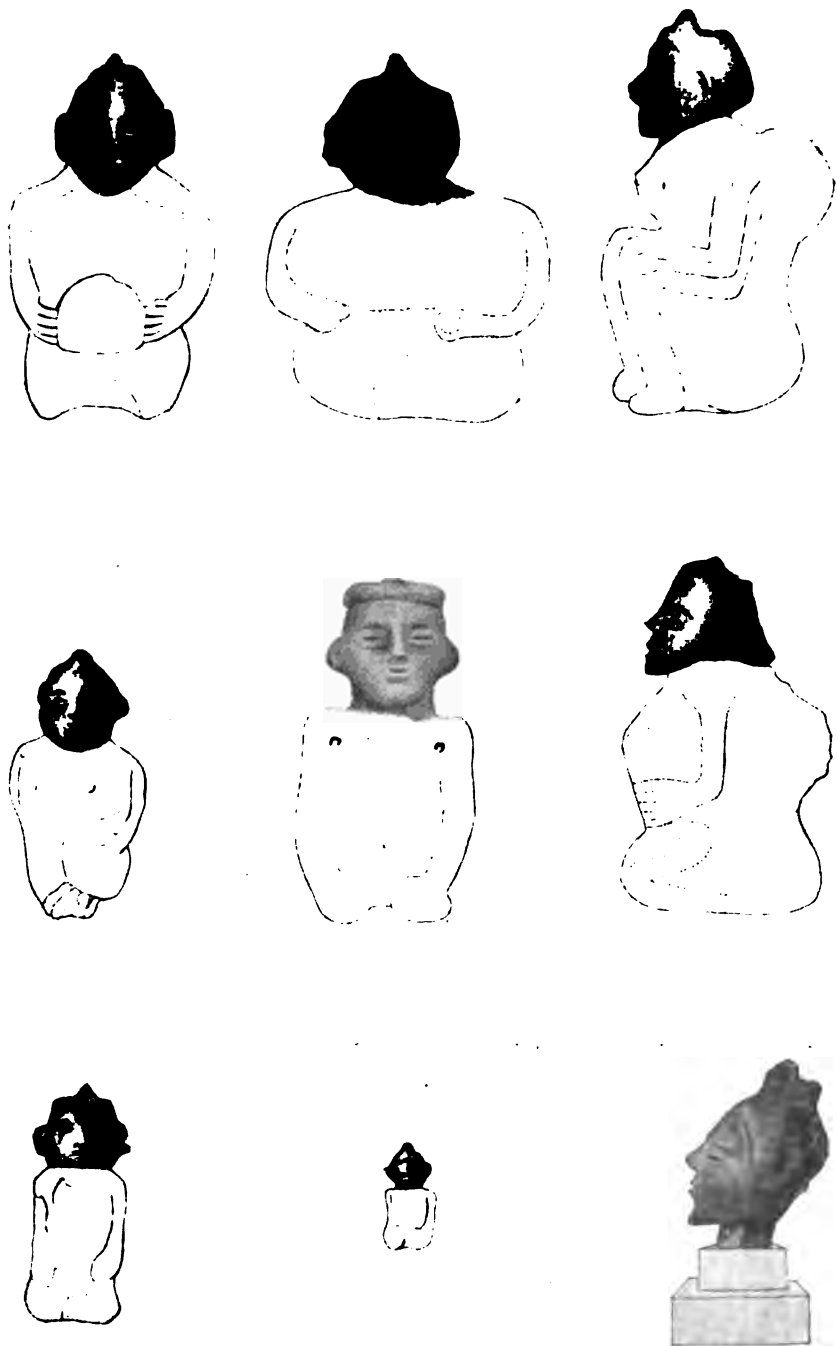
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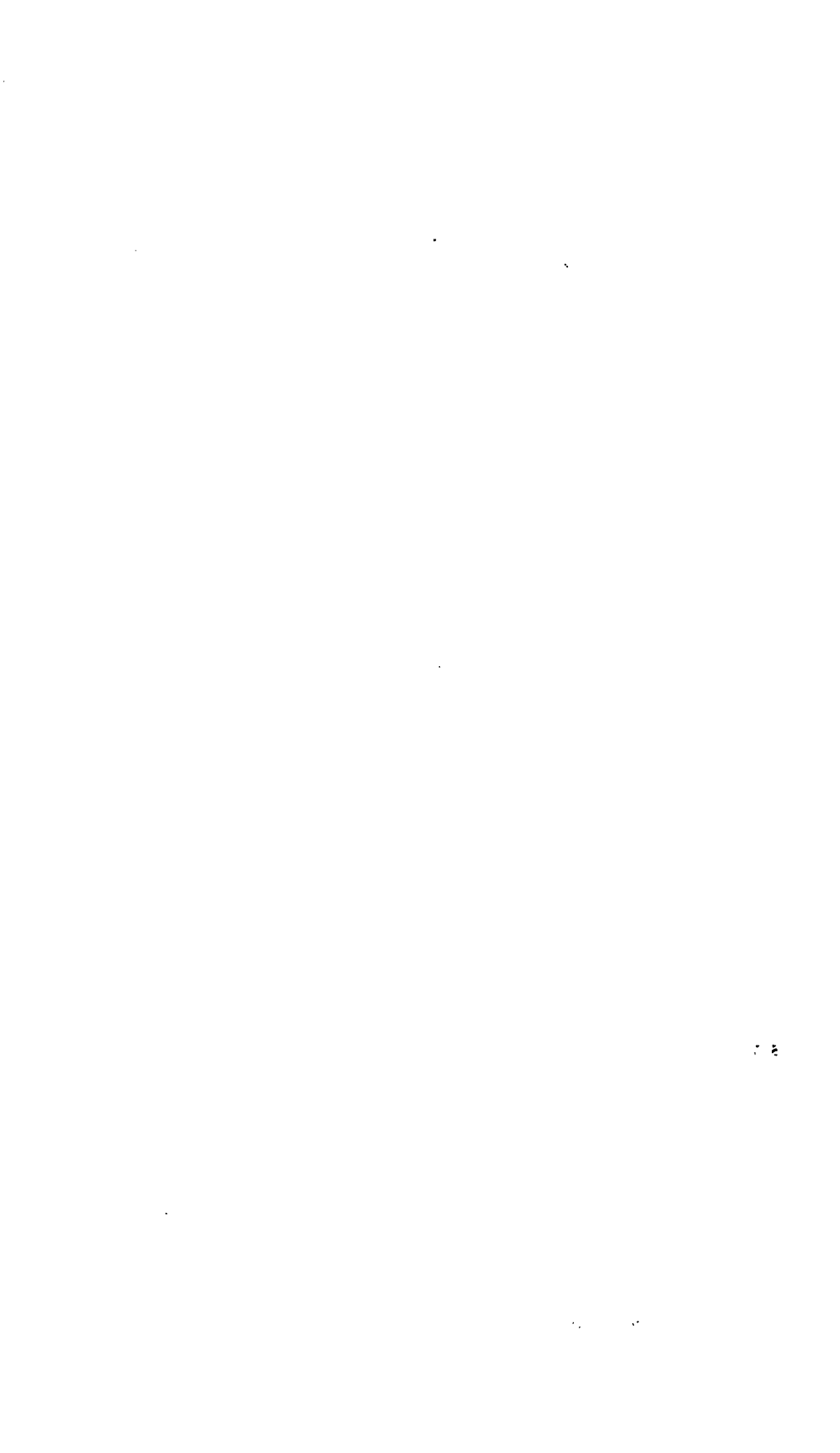
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SERIES OF EIGHTEEN EFFIGY BOTTLES FROM STONE GRAVES IN TENNESSEE,
REPRESENTING THE HUMAN FACE.

General Thruston's collection, Nashville, Tennessee.

‡ natural size.



(a) From Monmouth, New Jersey (*American Naturalist*, p. 70, 1889); Cat. No. 61474, U.S.N.M. (b) From Southfield, Staten Island; Cat. No. 66133, U.S.N.M.

TWO RUDE SCULPTURED HEADS IN STONE.



a mound in Union County, Illinois, by Mr. T. M. Perrine. The figure, like many shown, occupied a sitting posture, the base being flat so that the statue will sit alone. It differs from many of the foregoing in several respects. The right knee is drawn up to the chin so that the foot is placed flat upon the ground; the forehead is receding or retreating, but the head is not thrown back and the chin is not in the air. While the face is round, yet it is not round as are the others. The high cheek bones and great breadth across the middle of the face so noticeable in the former are absent in this. The roll of hair around the top of the head is differently managed. But the greatest differences are in the features. The forehead is not flat either way, but, on the contrary, is quite well rounded; the eyebrows are not cut out, producing a ridge across the face, as in the former specimens; the bridge of the nose is on the same plane as the forehead; the eyes, nose, and lips differ in style and mode of making and, in fact, they represent an individual in such a different light as that one might easily suppose it belonged to a different race from the former. The eyelids are well developed, the eyeball is well rounded, and the pupil is prominent. The nose and mouth are heavy and thick, and, without having any relation to the negro race, they are far from representing the aquiline nose and thin lips in the former figures. Plate 47 represents a specimen of the same type. The position of the body is the same, and the peculiarities of eyes, nose, and mouth are repeated.

We pass to a still different geographic area. Plate 52 represents two rude figures of human heads, the smaller one from Monmouth, New Jersey, reported in 1882.¹ The larger one was found in Southfield, Staten Island, near the Fingerboard Road. A glance is sufficient to show the similarity in appearance of the two individuals here represented, and their dissimilarity with the two geographic groups heretofore described. The shape of the forehead, nose, lips, chin, indeed of every feature in both statues, is noticeably different from the others. The expression of the mouths and chins of these two are slightly different from each other, but this might have arisen from want of skill of the artist. There is nothing of the flat or dish-faced appearance, so prominent in the southern group, nor is there anything of the round or moon-



Fig. 132.

CLAY STATUE.

Height, 12 inches.

Mound, Union County, Illinois.

T. M. Perrine. Cast, Cat. No. 30249, U.S.N.M.

¹ American Naturalist, 1882, p. 799.

faced appearance in the second group. The forehead is reasonably high, and while retreating or receding, it is not on the plane of the face, as in the southern and other groups.

Fig. 133 is a cast of a pipe from Ohio. Whether it represents the same style as the immediate foregoing or not, it is introduced by reason of its similarity and possible relation. The mouth is similar to those in former representations. It is shown as widely open and deeply excavated. The eyes are represented by excavations only, but the forehead and face are the same general type as those in Plate 52, from New Jersey and Staten Island. The nose and lips are mutilated beyond recognition, except that the root of the former is shown broad and not

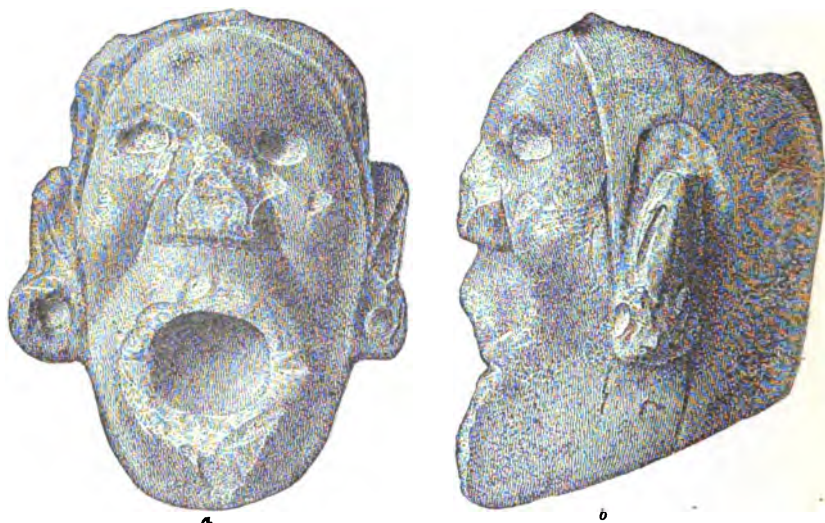


Fig. 133.

PIPE, REPRESENTING SCULPTURED HUMAN HEAD.

Ohio.

Cast, Cat. No. 31750, U.S.N.M. $\frac{1}{2}$ natural size.

thin or pinched. The eyes are different from either of the former groups, and the cheek bones, while high and prominent, have a different contour. This is largely produced by the sunken cheeks, which are not shown in either of the former groups.

No argument is sought to be made that there were different races of aborigines, because of the similarities of the sculptures of the same group or the dissimilarities between the different groups. The author has no intention to do more than note and present the various styles of sculpture, leaving the ethnologic results and conclusions to be worked out at a future time.

Bronze head (Louvre).—A curious and unique piece of bronze sculpture (Plate 53) having a possible relation to the North American Indian, belongs to the Gallery of the Louvre, Paris. But little is known of its history. It formed part of the collection of Edmund Durand, which



ROMAN (?) SITULA IN BRONZE REPRESENTING HUMAN HEAD, BELIEVED TO BE OF A
NORTH AMERICAN INDIAN.

Louvre Museum.

A. de Ceuleneer, *Antiquités du Louvre*, 1830.

the King, Charles X, purchased for the Louvre in 1825. Its peculiarities were first noticed by M. Adrien de Longperier.¹ The same article was reproduced in his work.² This bronze is classed as No. 826, in the catalogue of the Museum.³ It is thus described:

Bust of a slave whose head and face are entirely shaved. The ears are large and hanging. The top of the skull opens by means of a hinge, which is attached to a cover. Above the ears are placed on either side rings in which are adjusted a swinging handle, which represents a branch or twig with buds.

It is first to be remarked that the object is what was called a Roman *situla*, being a bucket, jug, or kettle, which might be used as shown, for carrying liquids. This style of object is essentially Roman, and from it and the general appearance of the object, its patine, etc., it was the opinion of M. de Cueleneer, professor of the university at Ghent, by whom my attention was first called to it, that the object belonged, or could be assigned to, the century before the Christian era.

The author once lived in Ghent, where he was acquainted with M. de Cueleneer, who has been twice in Washington, and during his visit to the National Museum became much interested in the Catlin Gallery of Indian Portraits, of which the United States National Museum published a catalogue filling the entire report of the year 1885. The author procured a copy of this report for M. de Cueleneer, who has used it with good effect in his notice of the bronze *situla* now under consideration.

It was his opinion, although this bronze piece was made probably in Italy during the first century prior to the Christian era, that it represented, or may have represented, a red Indian from America. In support of this contention he presented about a dozen figures of Indian heads, taken principally from the National Museum Catalogue of the Catlin Gallery; and he called special attention to the similarity of the anatomical and somatologic characteristics and peculiarities represented in both. He says of the bronze head that the skull is dolichocephalic, the forehead is retreating, the ears are large and low and the lobes adherent, the eyebrows are strongly arched, the nose is aquiline, the angles of the mouth are turned up and the lips large, the under jaw is rounded, the occiput is protuberant. The discovery of this bronze afforded M. de Longperier in a partial, and M. de Cueleneer in a complete manner, the opportunity to correlate and explain certain fragments of notes by Cornelius Nepos which seemed to have always troubled and disconcerted commentators. He speaks of the "Indian slaves" as having been cast away by the sea on the coast of Germany. These fragmentary notes of Cornelius Nepos have been preserved by Pomponius Mela and by Pliny, the naturalist.

¹ Bull. de la Soc. imp. des Antiq. de France, 1859, pp. 83-85 (t. XXVI des Memoires).

² Volume II, pp. 452, 453.

³ Notice des bronzes antiques exposes dans les galeries de Musée Imperial du Louvre, 1^{re} partie, 1868, p. 143.

Pomponius Mela says: ¹

Testum autem rei, Quintum Metellum Celerem adiecit, eumque ita rettulisse commemorat: cum Gallie proconsule pracescit, Indos quosdam a rege Botorum dono sibi datos; unde in eas terras devenissent requirendo cognosse, vi tempestatum ex Indicis aquoribus abreptos, emensosque quae intererant, tandem in Germaniae litora exisse.



Fig. 134.

SCULPTURED HUMAN HEAD,
LIMESTONE.

Collected by President Thomas Jefferson.
Cat. No. 16816, U.S.N.M.
 $\frac{1}{6}$ natural size.

Pliny records the same fact as follows: ²

Idem Nepos de septentrionali circuitu tradit Quinto Metello Celeri L. Afrani in consulatu collegae, sed tum Gallie proconsuli, Indos a rege Suevorum dono datos, qui ex India commercii causa navigantes tempestatibus essent in Germaniam abrepti.

The reports of these two writers agree in all essential parts, except the word Botorum in Pomponius Mela, and Suevorum in Pliny. Subject to this variation, the story of both, as reported by Cornelius Nepos, is that a king (of the Botes or of the Sueves) made a present to Quintus Metellus Celeri of an Indian or Indians, who, having been cast away at sea, were stranded on the coast of Germany. M. de Cueleneer, in his paper, "Type d'Indien du Nouveau Monde Représenté sur un Bronze Antique du Louvre" (1890), goes profoundly into this branch of the subject, shows who Metellus was, where, and at what epoch he was in command, and how he might have received from one of the barbarian kings or tribes a present of slaves, which might have been Indian castaways from the coast of North America. He then recites the discovery of the bronze situla in the Louvre, and by an examination of its workmanship and appearance concludes it was made in Italy during the first century before the Christian era, and from its great resemblance to the red race of America, as represented in the Catlin Gallery, he concludes the chances are favorable for it having been a sculptural representation of a North American Indian.

Fig. 134 represents the sculpture of a human head almost life-size cut from limestone. It is of interest irrespective of any intrinsic value, on account of having been in the possession of President Thomas Jefferson while he lived at Monticello. Although much mutilated, it is still sufficiently preserved to show creditable aboriginal workmanship. There is no exaggeration or deformity in any part of this head, which might be a likeness of an aged person with a deeply wrinkled face. A conical cavity in its base served to keep it in position. There is another cavity in the back of the head. The records of the Smithsonian Institution contain no information as to the locality whence it came.



Fig. 135.

DARK FERRUGINOUS
STONE, A NATURAL
FORMATION MOD-
IFIED BY CARVING
OF EYES, NOSE,
AND MOUTH.

Ohio.

Cat. No. 12992, U.S.N.M.
 $\frac{1}{3}$ natural size.

¹De Chorographia, III, 5, 15 (ed. G. Parthey, Berlin, 1867).

²Historiae naturalis libri, II, 67.



"THE PRAYER TO THE GODS OF THE CHASE." TWO CROUCHING LIONS, SCULPTURED FROM SOLID ROCK.

Pueblo region, New Mexico.

Reproduced from painting of E. W. Denning, artist, by permission from Klackner, photographer, New York City.

Fig. 135, from Ohio, is a natural formation of dark ferruginous stone, which has been modified by the carving of eyes, nose, and a wide-open mouth.

Fig. 136 is a cast in the United States National Museum of a sculptured stone representing a human face and head in profile, discovered in 1863-64 near St. George, Charlotte County, New Brunswick, Canada. The stone on which this sculpture was made is $21\frac{1}{2}$ inches high by $18\frac{1}{4}$ inches wide and 2 inches thick. It is granulite, distinguished from granite proper by the absence of mica.

Plate 54 represents the sculptured statues of two stone lions, crouching, carved by aboriginal artists. They are cut out of the solid outcropping rock, supposed to have been done with obsidian knives, but this has not been verified. There are two pairs of these lions, both on the high mesa (in the country of the Cochitanos, west of the Rio Grande), one near the prehistoric ruined pueblo of Potrero de las Vacas, the other pair near the same kind of pueblo Potrero de la Idelo. The latter pair have been wrecked by some enterprising prospector, who drilled and exploded one of them with dynamite.



Fig. 136.

PROFILE OF HUMAN FACE, SCULPTURED IN STONE.
St. George, Charlotte County, New Brunswick, Canada.
Cast, Cat. No. 35601, U.S.N.M.

The painting¹ from which the Las Vacas plate was taken was made by Mr. E. W. Deming, artist, and was first seen by the author at Veerhoff's, F street, Washington City. An application to the artist secured the foregoing description, with the explanation that these sculptures are still regarded with superstition and as having supernatural power, insomuch that the older Cochitano Indians believe them to be the gods

¹ It has been photographed and copyrighted by Klackner, of New York, to whom the author is indebted for the copy and the right of reproduction.

of the chase, and make invocations and prayers to them preparatory to going on a hunt. Mr. Deming has represented such a scene.



Fig. 137.

SANDSTONE MASK, RUDELY REPRESENTING A HUMAN FACE.

Lawrenceburg, Indiana.

Cast, Cat. No. 10018, U.S.N.M.

Masks.—Not infrequently aboriginal sculptures have been found, some among the savages of the United States, but in greater numbers in Mexico, which have been called masks, being made of flat and comparatively thin stone with human features sculptured thereon. Similar masks are reproduced on the Pacific coast, far north, in wood with various painted decorations, and also form part of the discovery of Mr. Cushing on the southwest coast of Florida.

Fig. 137 represents a mask roughly carved from sandstone. It is 12 inches high, $7\frac{1}{2}$ inches broad at the ears, and weighs nearly 9 pounds. As usual, it is slightly concave at the back. It was found while plowing near Lawrenceburg, Indiana. Figs. 138 and 139 are face and profile views of a mask of sandstone found in Belmont County, Ohio, nearly opposite

Wheeling. Neither of these have any marks or holes in the back for suspension or attachment. The similarity of the art work of these with that of fig. 140 will be apparent at a glance, and it may be queried whether the similarity of appearance may not have some application to race, but upon the latter proposition no opinion is expressed.

Fig. 140 is a small stone mask from Gambier, Ohio. It displays better art in the working of the material than in its representation of the human face. The stone is quite hard, it can only be wrought by pecking or battering and then rubbing or grinding to make it smooth. The horns projecting from the head are for an unknown purpose; the ears are too low on the side of the head; the nose and mouth are impossible in the human subject, but with all these peculiarities the stone has been well wrought and nicely polished.



Figs. 138, 139.

STONE MASK, HUMAN FACE, FRONT AND SIDE VIEWS.

Belmont County, Ohio.

Cast, Cat. No. 39014, U.S.N.M. $\frac{1}{3}$ natural

Fig. 141 is a mask of grotesque appearance; it is of pot-stone from

Morgantown, Catawba County, North Carolina. The slab is about 2 inches in thickness, and the back is slightly concave. The mechanical art of the stone working is better than the artistic representation of the human face. The face is quite too long for its width. The features are extremely rude, the eyes being represented by mere excavations in the stone. The nose is a simple protuberance. The hair is not represented, and there is but a faint representation of eyebrows, which is made by a shallow groove running across the face from one temple



Fig. 140.

STONE MASK.

Gambier, Ohio.

Cat. No. 31384, U.S.N.M. Natural size.

to the other. The chin is represented by a square figure, and the neck might serve for a handle. There are many of these masks of different materials and style. Their purpose is unknown. A suggestion is given of the possibility of use of this specimen by the holes which have been drilled along the side, and which may have served for attachment. Some of the masks from Mexico and Central America have similar holes.

Fig. 142¹ represents two views of a bust carved from coarse marble, which was found in one of the small mounds on Colonel Tumlin's place

¹Twelfth Annual Report of the Bureau of Ethnology, 1890-91, pp. 30, 308, fig. 191.

on the Etowah River, near Cartersville, Georgia. Originally carved as a head or bust, the seams in the marble have opened and the face part has split off, forming a quasi mask. The representation is of the human face, which appears quite natural in its proportion and features; with, however, slight resemblance to the physiognomy of the North American Indian. This has no signification and is not worthy of consideration, for this group of mounds has furnished the copper and shell objects noted by Prof. W. H. Holmes in the Second Annual Report of the Bureau of Ethnology, quoted in my paper on "The Swastika," and described at length in the report of Professor Thomas.¹ Professor Thomas says that in all their leading features these designs are suggestive of Mexican or Central American work.



Fig. 141.

MASK, OF GROTESQUE APPEAR-
ANCE. POTSTONE.

Morgantown, Catawba County,
North Carolina.

Cat. No. 35001, U.S.N.M. $\frac{1}{2}$ natural size

Some of the Mexican sculptures were described in the paragraphs on jade. Masks and sculpture in stone from Mexico are here continued.

Fig. 143 represents a typical Mexican mask of greenish mottled feldspathic stone, and is 5½ inches long. Its back is slightly concave and the mouth and eyes have been excavated by drilling, as can be seen in the corners. It is finely polished throughout its entire surface. The holes in the edges by which it could be fastened are shown. Dr. Rau gave as his opinion that these masks were used for covering the faces of idols on certain occasions.

Figs. 144 and 145 are specimens from Mexico representing the human form.

Pipes.—The pipes used by the aborigines of North America were not infrequently ornamented with sculptured representations of men and women, but a greater number were ornamented with animal forms. The books written upon the archaeology of the North American aborigines abound in representations of these sculptures. Squier and Davis, Dr. Rau, Abbott's "Primitive Industry," Jones's "Antiquities of the Southern Indians," Thruston's "Antiquities of Tennessee," and similar works contain these representations in greater or less numbers. A few specimens of animal forms were not utilized as pipes, but it is entirely uncertain whether they were not unfinished specimens intended for pipes.

Engraved Tablets.—Certain engraved or incised stones or tablets have been found in the United States, under circumstances which

¹ Twelfth Annual Report of the Bureau of Ethnology, pp. 303-311, with plates XVII, XVIII, and figs. 186-192. See also fig. 150, p. 501.

identify them beyond all doubt as aboriginal. Their use is unknown, although it has been suggested that they served as stamps for impressing colored ornamental figures upon cloths or prepared skin. A peculiar class of these tablets of intaglio sculpturing are those represented in figs. 146 and 147. Fig. 146 represents the celebrated "Cincinnati tablet," now in the Art Museum, Cincinnati, Ohio, where it has been deposited by its owner, Mr. Gest. The authenticity of this tablet has been disputed.¹ It was found in December, 1841. The material is a compact, fine-grained sandstone of a light-brown color. It

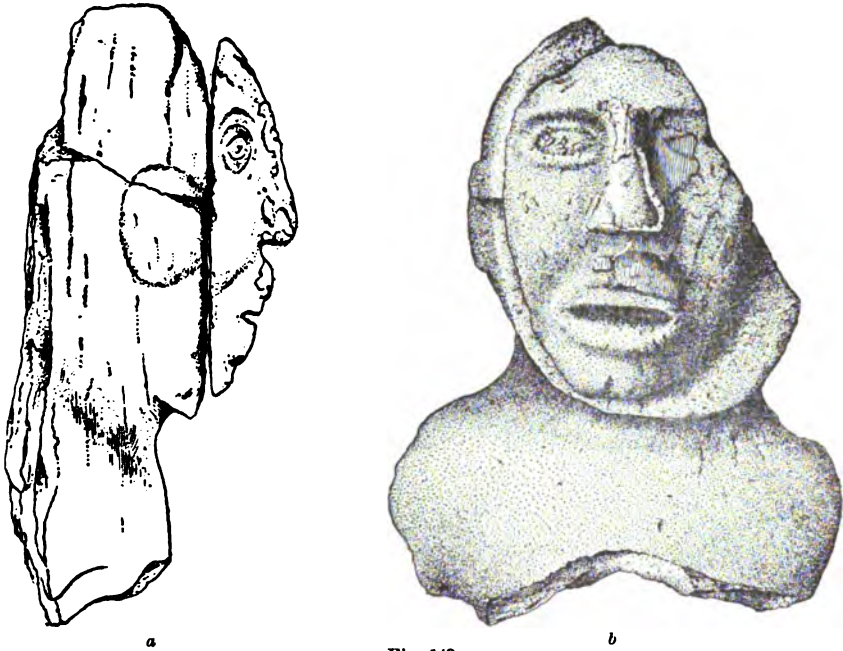


Fig. 142.

STONE MASK.

Etowah mound, Georgia. Coarse marble.

Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890-91, p. 308, fig. 191. Cat. No. 91110, U.S.N.M. $\frac{1}{2}$ natural size.

is 5 inches in length, 3 inches in breadth, and about $\frac{1}{2}$ inch in thickness. The figures are cut in low relief, the lines being not more than $\frac{1}{16}$ inch deep. This tablet had stood, from the time of its discovery until the meeting of the American Association for the Advancement of Science at Springfield, August, 1895, without any serious attempt at explanation or translation, when this work was attempted by Professor Putnam and Mr. C. C. Willoughby under the title "Symbolism in Ancient American Art."

¹The question is argued at length in the Transactions of the American Ethnological Society, II, and in Squier and Davis's "Ancient Monuments of the Mississippi Valley," p. 274, figs. 194 and 195.

Fig. 15 [146] is the "Cincinnati tablet," showing the serpent combined with the human form. A careful study of this complicated design shows it to be formed on the same principle as those carved on bones. Not only is the duplication of the right and left sides apparent, but there is also a remarkable duplication of the different parts when they are reversed, the right and left and the upper and lower. This is shown in the reduced outlines given in fig. 16, of which *a* shows the human figure as in fig.



Fig. 143.

MASK, FELSPATHIC STONE.

Mexico.

Cat. No. 98989, U.S.N.M. $\frac{1}{4}$ natural size.

15. We notice here the ears, *cc*, as straight bars on each side of the head; the eyes, the two dark circles, each with two projecting curved arms; the nose, the lozenge-shaped space, and the broad mouth, the transverse white space below. The body includes the two oval figures in the center, which are duplicates of each other, as will be seen by folding the upper over the lower. The arms curve outward and the hands are shown at *dd*, with the fingers pointing inward; the three middle fingers are represented by the trefoil between the long curved thumb above and the little finger below. The legs project from the lower portion of the body and are bent upward at the knees, *ff*; the feet with the toes pointing outward, *ee*, are duplicates of the hands. Here the duplication is with the left foot and the right hand turned upward on each other and reversed; the same with the right foot and left hand; while the duplication is again shown by folding the hands and feet of one side upon the opposite side.



Fig. 145.

HUMAN IMAGE, IN HARD OR SEMI-PRECIOUS STONE.

Northeast Mexico.

Collected by Dr. Berlandier.
Cat. No. 5486, U.S.N.M.
Natural size.

In the reverse¹ of this human design (shown in fig. 16b) the two serpent heads are shown at the bottom of the figure, with the slender necks extending off on each side and connecting with the central portion of the design; *j* indicates the jaw of each serpent head. The symbolic eye with its double arms is seen above the jaw, and the four horns or plumes of the serpent, two above and two below, curving backward, are of the same character as shown on many other serpent heads from Mexico and Central America. The double reversal of the several portions of the whole design can readily be seen by following the lines on the opposite sides of these reversed outlines, *a* and *b*.



Fig. 144.

HUMAN IMAGE, OF GREEN MOTTLED STONE.

Mexico.

Collected by Dr. Berlandier and
presented through Gen. D. N.
Couch. Cat. No. 5484, U.S.N.M.
 $\frac{1}{2}$ natural size.

Fig. 147 is a representation of a cast of a tablet of compact Waverly sandstone taken from a mound near Waverly, Pike County, Ohio, during the month of March, 1872, by Dr. Hurst, of Piketown. It was obtained by Mr. J. P. Maclean, who sold it to Mr. Robert Clarke, of Cincinnati, who has deposited it

¹ Meaning upside down.

in the art museum of that city. The sculptured figures on this tablet are in low relief, resembling somewhat those on the "Cincinnati tablet." (Fig. 146.) This similarity is recognizable at a glance. The work is so much alike that they might have been done by the same artist, but the figures in outline and character are so different as to seriously affect the theory of the symbolism and duplicate representation of man and serpent. There is in this, apparently, neither head, mouth, body, nor extremities, which have been so elaborately and ingeniously discovered and described in connection with the former tablet.

Footprints.—A peculiar and as yet unexplained series of stone sculpturings have been found in the territories now forming the United States, and which are believed to be unique among its aborigines. These are sculptured footprints, and they have given rise to much speculation and discussion. The footprints at Carson, Nevada, were a source of great wonderment, nor has their origin been settled in a manner acceptable to all. Specimens of footprints have been found in the lava or volcanic mud in Nicaragua (Cat. No. 98757, U.S.N.M.) and possibly other Central American States, yet they were the actual footprints, and had no relation to the art of sculpture. But in divers portions of the United States actual sculptured specimens have been found. Fig. 148 represents a pair of human footprints sculptured on



Fig. 146.

"CINCINNATI TABLET."

Original in Cincinnati Art Museum, property of Mr. Gest.

Cast, Cat. No. 72650, U.S.N.M. Natural size.

a sandstone slab, or rock, on the Upper Missouri River. This slab, as shown in the figure, was cut out from its original resting place. The work was done by Captain Little, United States Army, and presented to the United States National Museum by him. The tracks are about 11 inches long and represent the feet as covered with moccasins.



Fig. 147.

"WAVERLY TABLET," SANDSTONE.

Waverly, Ohio.

Cincinnati Art Museum, property of Mr. Robert Clarke.

Cast, Cat. No. 28060, U.S.N.M. Natural size.

Fig. 149 is another specimen representing the print of a naked human foot with several cup markings on the same surface. It was cut in a flattish quartzite boulder, and was found in Gasconade County, Missouri, by Mr. John P. Jones, by whom it was sent to the National Museum. The length of the track is 9½ inches. The opposite side of the boulder bears a footprint less distinct than this.

Sculptures similar in appearance to the latter, but representing the human hand instead of the foot, have been found among the aborigines. One (Cat. No. 43126, U.S.N.M.), on a flat and smooth limestone or marble slab, was found in a

mound near Naples, Illinois, and presented to the United States National Museum by Mr. J. B. Henderson. It represents the hand more by outline than intaglio. It is about twice the natural size, and shows the fingers spread widely apart.

POTTERY.

After stone, pottery came into the greatest use in prehistoric times. It has peculiar interest to us in that it was the material which lent itself most readily to art purposes, and again from its great resistance to the ravages of time. The manifestation of art on pottery in the way of decoration could be perpetuated, not only from its enduring character, but when broken into fragments the decoration would not be lost. The greatest number of patterns and art motifs of prehistoric times throughout the Eastern Hemisphere have been perpetuated in the fragments of pottery.

EUROPEAN.

Neolithic.—It has been contended that pottery was not employed in western Europe during the Paleolithic period. The consensus of opinion is in favor of the existence of pottery during this period in some portions of Europe, while it did not exist in other portions. Some of the caverns of Belgium, which have otherwise yielded no objects but such as are identified with the Paleolithic period, still have yielded fragments of pottery. There is in the museum at Brussels, Belgium, a vase almost entire, reconstructed from the fragments found in one of these caves. But there is continually the question of intrusion and subsequent occupation. It is the definite opinion of M. de Mortillet that no evidence has been discovered of the use of pottery in France or England during the Paleolithic period. During the Neolithic period and the Bronze age, pottery abounded throughout western Europe, and it is now found in quantities in nearly all localities occupied by prehistoric man in these ages.

There is considerable variation between the potteries of different localities; difference in material, some being coarser, others finer, and in shape or form, and in decoration.

The northwest coast of France, including the ancient province of Brittany, seems to have produced the finest pottery after that of Denmark; while that of the central and southern parts of France and of England seems to have been coarser and ruder. It is no purpose of this paper to describe the making of pottery, but one may say that in all this prehistoric period the pottery vases were made without the use of the wheel or furnace. All evidence points to the introduction of the latter into western Europe from Greece through Etruria and Rome. It was not until the Roman conquest of France and England that these countries were affected by the knowledge of the wheel and furnace, and this can be carried a step farther, for within the memory of living men this knowledge had not been spread throughout the British islands. In northern Scotland and among the Orkneys and Hebrides islands the rude household pottery



Fig. 148.

SCULPTURED HUMAN FOOTPRINTS IN SANDSTONE ROCK.

Upper Missouri River.

Collected by Captain Little, U. S. A. Cat. No. 7637, U.S.N.M. $\frac{1}{2}$ natural size.

is made in the same manner as in prehistoric times, and apparently this knowledge had descended from generation to generation unaffected by outside influences. The theory has been put forth that prehistoric pottery was hardened by exposure to the sun. While exposure to the sun might harden it sufficiently to maintain its form and to hold substances of little weight and no moisture, yet for the ordinary uses of pottery the hardening by the sun is insufficient, and it is believed that all pieces and fragments of prehistoric times were burnt.

These prehistoric vases were for the most part rounded at the bottom and unable to sit alone. The suggestion is made, by way of explanation, that they were suspended over the fire, and anything in the way of a bottom as a base or legs would interfere with this, and therefore the bottoms were rounded.



Fig. 149.

SCULPTURE OF NAKED HUMAN FOOTPRINT ON A
QUARTZITE BOWLING.

Gasconade County, Missouri.

Collected by John P. Jones. Cat. No. 15793, U.S.N.M.

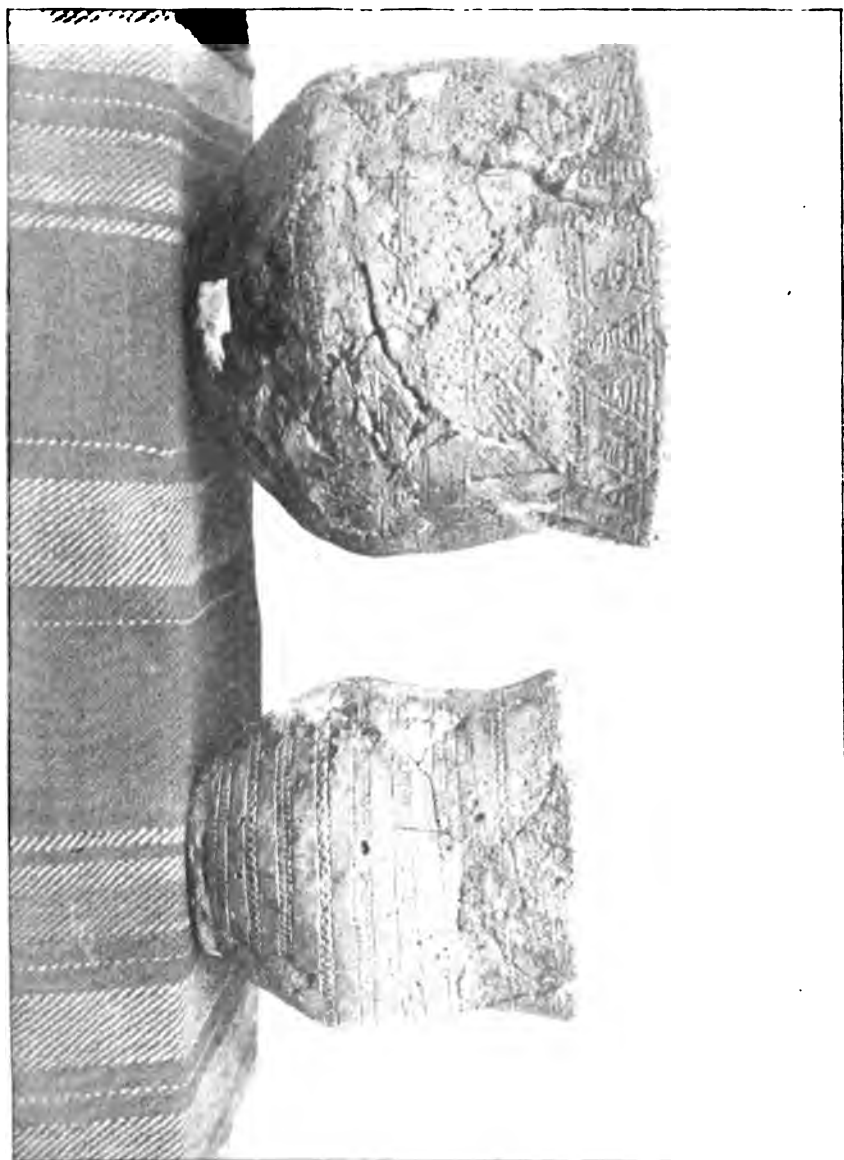
$\frac{1}{2}$ natural size.

The form most affected throughout western Europe for pottery vases was that called the tulip. It was the commonest in Brittany, where the material was the finest; but it was also used in England, in Hanover, Bohemia, Hungary, Sicily, and in Portugal. Plate 55 represents two vases of the tulip form, with characteristic ornamentation, from southeastern France. They were found in a dolmen in the neighborhood of the little hamlet of St. Vallier, in the department of Alpes-Maritimes, where the author spent a summer in archaeological researches. They were found by and are the property of M. Casimir Bottin.

Plate 56 will show the form of pottery vases in various European

countries during the Neolithic period. The style of decoration has been shown in plates 19 and 20, and need not be further treated here.

Bronze age.—The pottery of the Bronze age was not materially different from that of the Neolithic period. There is, to be sure, a certain change of form; all specimens seem to have been smaller. There are a great number of cups, dishes, plates, etc. The paste is finer, the walls are thinner, and the decoration, while of the same general style, is a continuation of the lines, dots, and curves arranged in geometric form. They are, however, made lighter and closer together, giving the ornamentation a finer and more artistic air. With these exceptions, the pottery of the Bronze age was much the same as that of the Neolithic period.



POTTERY VASES OF TULIP FORM, THE STANDARD OF DOLMEN POTTERY.

St. Vallier (Alpes-Maritimes), France.
Collected by M. G. Bérard. A natural size.

EXPLANATION OF PLATE 56.

1	3	12
2	5	6
8	- 4	10
9	7	11

- Fig. 1. From Morbihan, France.
 Fig. 2. From Vienne, France.
 Fig. 3. From Morbihan, France.
 Fig. 4. From Northumberland, England.
 Fig. 5. From Seine-et-Marne, France.
 Fig. 6. From Terramare of Mercurago, Italy.
 Fig. 7. From Denmark.
 Fig. 8. From Paris.
 Fig. 9. From Morbihan, France.
 Fig. 10. From Mönshheim, near Worms, Germany.
 Fig. 11. From Denmark.
 Fig. 12. From Robenhausen, Switzerland.



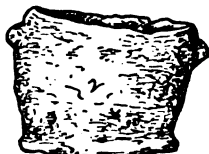
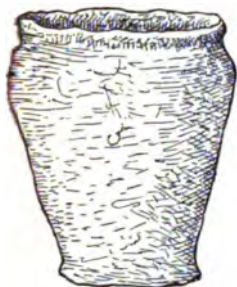
1



3



12



2



6



8



4



10



9



7



11

ART FORMS OF VARIOUS POTTERY VASES IN EUROPEAN COUNTRIES.

$\frac{1}{2}$ natural size.

Canon Greenwell, in his work on British Barrows,¹ speaking of the prehistoric pottery found therein, says:

The most common forms of ornament are alternate series of parallel horizontal and vertical lines (like heraldic compone, if it were engraved as of gules and azure); now and then in a double series (as counter compone); triangles set in rows (or, rather, what heralds call a dancette line of partition), the triangular space formed being filled with parallel diagonal lines, which have a different direction in each alternate space (like alternate representations of heraldic purple and vert); rows of round or oval impressions encircling the urn; lines forming a reticulated pattern; lines placed herring bone fashion, or in a zigzag. The lines are often made by impressions of twisted thong or cord, but sometimes are drawn on the clay with a sharp-pointed instrument. In some rare cases raised ribs occur in the rim [fig. 59], and one from Rosebrough, Northumberland, has a series of figures in relief [fig. 60].

Many of the designs on plates 19 and 20 are taken from Canon Greenwell's book, and are such as here described.

The first material change in pottery in France and England was possibly brought from Etruria. The next was by the importation of the Samian or Aretine ware brought by the Romans. This pottery was thick, heavy, hard, resisting all ravages of time, and, except for breakage, the specimens now found are as perfect as they were originally. It was of finer paste, still not made with the wheel, but in molds. The ornamentation was in relief, being usually on the outside, the soft paste having been pressed into the mold. Most of these specimens were brought to western Europe by the Romans themselves, though it is supposed they were made there during the long period of Roman occupation.

Grecian, Etruscan, and Roman pottery were all different from anything more modern. The knowledge of their manufacture has been lost, and all these kinds of pottery have become extinct. They are almost prehistoric, but because of the localities wherein they have been found, and the objects with which they were associated, they have come to be placed under the head of Classic, rather than Prehistoric, Archaeology. The works on that subject should be consulted by any one desirous of pursuing the study.

UNITED STATES (EXCLUDING THE PUEBLOS).

Neolithic.—Without attempting a discussion of the differences of the culture status of the Neolithic period in the country occupied by the North American savage, and other countries of the Pueblos, Mexico, Central and South America, it is sufficient to say that there certainly were great differences in the pottery manufactured by the respective peoples of these countries. The southern potteries are so different and so superior to those of the peoples to the north that it would require a volume to do them justice. All present attempts will be confined to northern Neolithic peoples.

Professor Holmes's description.—Professor Holmes has gone quite thor-

¹ Page 71.

oughly into the subject of the pottery of this country, and reference is made to the numerous papers he has published.¹ Anyone desiring to examine the subject in detail is respectfully referred thereto. This paper deals only with art, and consequently only with form and designs of decoration.

In his paper on "The ancient pottery of the Mississippi Valley²" he epitomizes the propositions, thus:

Form.—This ware exhibits a great variety of form, many of which are extremely pleasing. In this respect it is far superior to the other prehistoric groups of the eastern United States. The shapes are as varied and elegant as those of the ancient Pueblo pottery, but are inferior to those of Mexico, Central America, and Peru. * * *

Finish.—The finish, as compared with the work of civilized nations, is rude. The surface is often simply hand or trowel smoothed. Generally, however, it was more or less carefully polished by rubbing with an implement of stone, shell, bone, or other suitable substance, the markings of these tools being distinctly visible. Nothing resembling a glaze has been found on pieces known to be ancient. The surface was sometimes washed or coated with a slip or film of fine clay, which facilitated the polishing, and in very many cases a coat of thick red ochre was applied.

Ornament.—The ancient potter of the middle province has taken especial delight in the embellishment of his wares, and the devices used are various and interesting. They include, first, fanciful modifications of form; second, relief ornament; third, intaglio figures, and fourth, designs in color.

Modification of shape.—It can hardly be claimed that the ancient peoples of this region had a very refined appreciation of elegance of outline, yet the simple, essential forms of cups and pots were by no means satisfactory to them. There are many modifications of shape that indicate a taste for higher types of beauty and a constant attempt to realize them. The æsthetic sentiment was considerably developed.

There is also a decided tendency toward the grotesque. To such an extreme have the dictates of fancy been followed in this respect, that utility, the true office of the utensil, has often taken a secondary place, although it is never lost sight of entirely. Bowls have been fashioned into the shapes of birds, fishes, and reptiles, and vases and bottles into a multitude of animal and vegetable forms without apparent regard to convenience. All of these modifications of essential forms were doubtless looked upon as in a sense ornamental. So far as I can determine they were in no case intended to be humorous.

Relief ornament.—Decorative ideas of a purely conventional character are often worked out in both low and salient relief. This is generally accomplished by the addition of nodes and fillets of clay to the plain surface of the vessel. Fillets are applied in various ways over the body, forming horizontal, oblique, and vertical

¹Ancient Pottery of the Mississippi Valley. (Proc. Davenport Acad. Sci., IV, 1884.)

Origin and development of Form and Ornament in Ceramic Art. (Fourth Annual Report of the Bureau of Ethnology, 1886.)

Ancient Pottery of the Mississippi Valley. (Fourth Annual Report of the Bureau of Ethnology, 1886.)

Pottery of the Ancient Pueblos. (Fourth Annual Report of the Bureau of Ethnology, 1886.)

Earthenware of Florida. (Certain Sand Mounds of the St. Johns River, Pt. 1. By Clarence B. Moore. 1894.)

Ceramic Art of the Eastern United States. (Report of the Bureau of Ethnology, not yet published.)

Caribbean Influence on the Prehistoric Ceramic Art of the Southern States. (Amer. Anthropol., January, 1894.)

Order of Development of the Primal Shaping Arts. (Proc. A. A. A. S., 1894.)

²Fourth Annual Report of the Bureau of Ethnology, p. 373.

bands or ribs. When placed about the base or rim, these fillets are often indented with the finger or an implement in a way to imitate rudely a heavy twisted cord—a feature evidently borrowed from basketry. Nodes are likewise attached in various ways to the neck and body of the vessel. In some cases the entire surface of the larger vessel is varied by pinching up small bits of the clay between the nails of the finger and thumb. An implement is sometimes used to produce a similar result.

Intaglio design.—The æsthetic tendencies of these potters are well shown by their essays in engraving. They worked with points upon both plastic and the sun-dried clay, as well as at times upon the fire-baked surface. Figures thus produced exhibit a wide range of artistic achievement. They illustrate all stages of progress, from the most archaic type of ornament—the use of dots and straight lines—to the most elegant combinations of curves, and finally to the delineation of forms and fanciful conceptions.

Generally, when a blunt implement is employed, the line is produced by a movement that I shall call *trailing*, in contradistinction to *incision*, in which a sharp point is used, and *excision* or *excavation*, which is more easily accomplished with the end of a hollow reed or bone. *Impressed* or *stamped* ornament is of rare occurrence, and anything like *repoussée* work is practically unknown. The practice of impressing cords and fabrics was common among many of the northern tribes, and nets have been used in the manufacture and ornamentation of vases at many points within this province. Stamps especially prepared were in use in most of the Gulf States and to a limited extent in northern localities.

Designs in color.—The colors used in painting are white, red, brown, and black, and have generally consisted of thick, opaque, clayey paste, white or colored with ochers. Occasionally the colors used seem to have been mere stains. All were probably laid on with coarse brushes of hair, feathers, or vegetable fiber. The figures are in most cases simple, and are applied in broad, bold lines, indicative of a strong talent for decoration. The forms are to a great extent curvilinear, and embrace meanders, scrolls, circles, and combinations and groupings of curved lines in great variety. Of rectilinear forms, lozenges, guilloches, zigzags, and checkers are best known.

The decided prevalence of curved form is worthy of remark. With all their fertility of invention the inhabitants of this valley seem never to have achieved the rectangular links meander, or anything more nearly approaching it than the current scroll or the rectangular guilloche, while other peoples, such as the Pueblos of the Southwest and the ancient nations of Mexico and Peru, found in it a chief resource.

Mr. C. C. Willoughby, of the Peabody Museum, Cambridge, Massachusetts, has published in the *Journal of American Folk-Lore*¹ "An Analysis of the Decorations upon Pottery from the Mississippi Valley." It consists of 12 pages, with 21 figures, and represents the different motifs said to have been employed in the decorations upon pottery from the locality indicated. The similarities alleged are not always perceptible and the arguments based thereon are not always logical, but great latitude is permissible in such subjects.

BRONZE AGE.

It is not the intention of the author to attempt any description of the antiquity, origin, technology, or industry of the prehistoric people during the Bronze age. This would carry us into the realms of archaeology, while we have been confining ourselves to art. A few preliminary words may, however, be useful.

¹ January to March, 1897, X, pp. 9-20.

There appears to have been a gap or hiatus between the Paleolithic peoples and the Neolithic peoples in their occupation of western Europe. There certainly were vast differences between their respective cultures, and it has been believed there was a solution of the continuity of occupation in western Europe between these two epochs.¹

Since the discoveries of Judge Piette² in sundry caverns of southern and western France; of MM. Boule and Cartailhac³ in the Grotto of Reilhac (Lot), and the observations of M. Solomon Reinach⁴ on the "*Femme nue*," discovered in the caverns of Mentone by M. Julien, the hiatus between the Paleolithic and Neolithic periods has been controverted, and is not now regarded nearly so certain as formerly.

The contrary appears between the Neolithic and Bronze ages, at least for western Europe, where the introduction of bronze and its subsequent use for weapons and implements seems to have occurred among the same peoples. The advent of bronze for these purposes was by immigration or introduction from some other country, and the peoples (still in western Europe) who used it this year probably were the same as used the stone implements last year. Therefore the introduction of bronze, while it made changes in their implements and so wrought changes in their mechanical ability, yet had comparatively small influence upon their art.

We have already shown the differences between the art of the Paleolithic period and that of the Neolithic period; we have also shown how, in the Neolithic period, the art was confined to the merest decorations of objects, and that it consisted principally of geometric designs. Plates 19 and 20 are again referred to as giving an extended representation of the kinds and styles of ornamentation employed.

The decorative art of the Bronze age was but a continuation of that of the Neolithic period, and it is not impossible that an investigation into the origin of some of the specimens in plates 19 and 20 would show them to have belonged to the Bronze age; that is to say, the styles of ornamentation of the two periods or ages were practically the same, and the latter was but a continuation of the former, with such possible changes or additions as would naturally grow. The marked difference between the two ages was the substitution of bronze for stone in the material for cutting and piercing implements.

The question continually arises whence and how was bronze introduced into western Europe. Of course the answer is lost in antiquity, for there are no records. There is not, and from the nature of the case there can not be, any direct or positive testimony. We can depend only upon the evidence furnished by prehistoric archaeology. Many theories have been propounded, none of which have proved

¹ See pp. 374, 401, 415, 423.

² L'Anthropologie, 1895, p. 129; 1897, p. 168.

³ Etudes Ethnographiques et Géologiques par E. Cartailhac et M. Boule: Lyon, 1889.

⁴ L'Anthropologie, 1898, pp. 26-31; and Description Raisonnée Musée de Saint-Germain-en-Laye, p. 267.





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11



BRONZE SWORD AND DAGGER HANDLES.

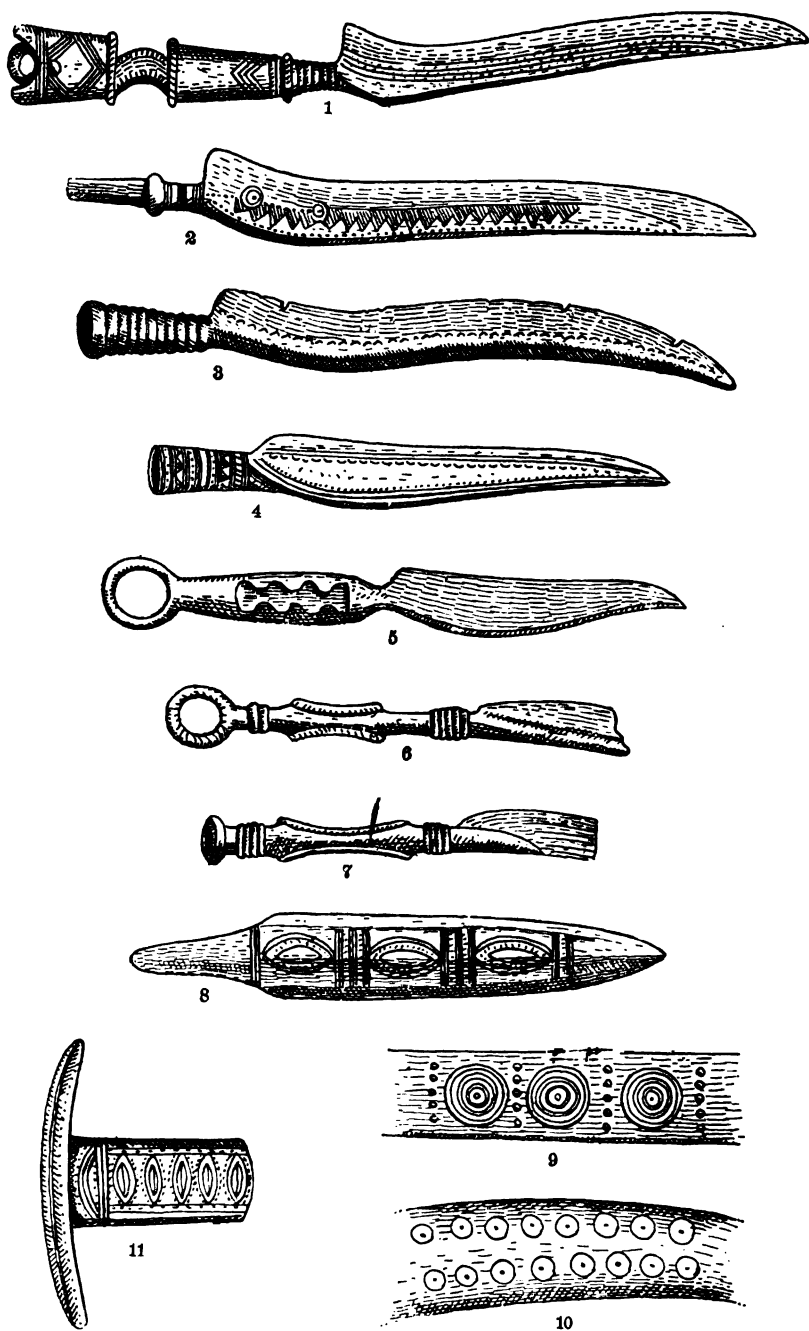
Europe.

† natural size.

EXPLANATION OF PLATE 57.

1	2	3	4
5	6	7	8
9	10	11	

- Fig. 1. Found in the Seine River at Rouen. Museum of Rouen.
- Fig. 2. From the deposit in the basin of Penhouet, St. Nazaire, France. Kerviller collection.
- Fig. 3. Hungary. National Museum, Budapest.
- Fig. 4. Canal of Thiele, Berne, Switzerland. Museum of Berne.
- Fig. 5. Hungary. Museum of St. Germain.
- Fig. 6. From the excavations of Alise-Sainte-Reine (Côte d'Or). Museum of St. Germain.
- Fig. 7. Vandrevanges, Germany. Museum of St. Germain.
- Fig. 8. Lake of Luyssel, Vaud, Switzerland. Museum of Berne.
- Fig. 9. Denmark. Museum of Copenhagen.
- Fig. 10. Denmark. Museum of Copenhagen.
- Fig. 11. Saint-Genoulph, Indre-et-Loire. Museum of Tours, France.

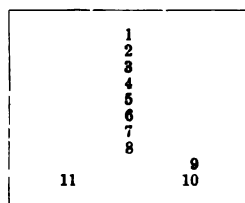


BRONZE KNIVES AND SCABBARDS.

Europe.

$\frac{1}{4}$ natural size.

EXPLANATION OF PLATE 58.



- Fig. 1. Auvernier, Lake Neuchatel, Switzerland. National Museum, Berne.
- Fig. 2. Möringen, Lake Bienne, Switzerland. Museum of Col. Schwab, Bienne.
- Fig. 3. From the Seine at Pas-de-Grigny. Museum of St. Germain.
- Fig. 4. Cache of Reallon, Hautes-Alpes. Museum of St. Germain.
- Fig. 5. Tomb of Courtevant, Aube. Morel collection.
- Fig. 6. Larnaud, Jura. Museum of St. Germain.
- Fig. 7. Larnaud, Jura. Museum of St. Germain.
- Fig. 8. Bracelet, ornamented, made into a poniard. Larnaud, Jura. Museum of St. Germain.
- Fig. 9. Fragment of scabbard. Sainte Anastasie near Uzès, Gard. Museum of Artillery, Paris.
- Fig. 10. Fragment of awl handle of deer horn, showing ornamentation. Terramare of Cornoccio, Italy. Museum of Parma.
- Fig. 11. Pommel of sword handle, Sarry (Saône-et-Loire), France. Bailleau collection.

entirely acceptable. The most general one is that bronze came from the far East, probably from the countries around the Straits of Malacca, and that it belonged to a period relating to the early Aryan dispersions. Bronze is one of the great epoch-making discoveries, greater than that of iron, and as a practical agent of prehistoric civilization, equaled only by the bow and arrow.

The discovery of the fusion of copper and tin, both comparatively soft metals, in the proportions of 90 and 10 per cent, making a new metal, harder than any other then known, capable of being cast, and when cast capable of being made sharp and holding a cutting edge, was a great step in human culture, and calculated to revolutionize the destiny of the human race.

STYLES OF DECORATION.

Plates 57 and 58 represent the art work done on various weapons and implements of bronze. Plate 57 represents sword handles, while plate 58 represents principally knives and scabbards. Articles of dress and for personal adornment, like bracelets, fibulæ, torques or ceintures, and similar objects, were made of bronze. These need not be displayed, for they all bear the same general style or type of art decoration. These will show that the decoration consisted principally of geometric designs, and will demonstrate the similarity of the decoration and art work in the Bronze age to that of the Neolithic period.

The Bronze age had no existence in the Western Hemisphere during prehistoric times. All objects of bronze found among the aborigines are believed to have come from Europe.

COPPER IN AMERICA.

Many objects of wrought copper have been found in America. The Lake Superior copper mines in the States of Wisconsin and Michigan appear to have been the center of manufacture, from which the distribution took place, and thence the manufactured implements spread, in gradually decreasing numbers, in every direction throughout the present territory of the eastern United States. The modes of treating copper, whether by smelting, melting, casting, or hammering, and if any or all of these, what amount of heating or melting was done, has never been fully investigated nor have they been satisfactorily determined. Some of the objects were certainly of virgin copper hammered cold, and they were thus made into bracelets, rings, and similar objects of personal adornment, and also into axes, knives, and spearheads. These copper weapons and ornaments continued to be used contemporaneously with cutting implements of stone and of ornaments of shell and bone.

The author is well aware of the contention that there was in Europe a Copper age intermediate between the Neolithic and Bronze ages, and he has visited and examined the national collection in the city of Berne, Switzerland, which contains the greatest proportion of copper

objects, and has furnished the principal basis for the argument of the existence there of a Copper age. No argument upon this or any similar question is attempted. The only proposition here presented is that copper was used in the neighborhood of Lake Superior to make cutting implements of similar form to those of stone, and that, despite the numbers of such implements found, copper did not change the culture of the peoples; it did not establish a Copper age as bronze established a Bronze age in Europe; it was not an epoch-making discovery or invention, and the mode of making and using stone implements by chipping and polishing, as in the purely Neolithic age, was not superseded by the discovery of copper.

Among the many mysteries of prehistoric archæology growing out of mound excavation in the United States, wherein things strange and wonderful but of undoubted genuineness and antiquity are found, none are more unexplained than the thin sheets of copper wrought by repoussé work into curious and unknown devices found in mounds and earthworks in widely separated regions of the country.

Etowah plates.—The principal specimens come from the Tumlin mounds on the Etowah River, near Cartersville, Georgia (Plates 59, 60). They have been figured in the reports of the Bureau of Ethnology¹ and in the author's paper on "The Swastika."² Of these specimens the principal comment made by Professor Thomas is in approval of that of Professor Holmes,³ that "in all their leading features the designs themselves are suggestive of Mexican or Central American work." Yet he adds that—

There are one or two features which are anomalous in Mexican or Central American designs, as, for example, where the wings are represented as rising from the back of the shoulders. The two plates are a combination of Mexican and Central American designs, the graceful limbs and the ornaments of the arms, legs, waist, and top of the head are Central American, and the rest, with the exception, possibly, of what is carried in the right hand, are Mexican.

Professor Thomas continues:

That these plates are not wholly the work of the Indians inhabiting the southern section of the United States, is admitted; that they were not made by an aboriginal artisan of Central America or Mexico of ante-Columbian times, I think is probable, if not from the designs themselves, from the apparent evidence that the work was done in part with hard metallic tools.

To the latter conclusion the author does not agree. The proposition may be true, but there is no evidence of it.

Fig. 150 represents a figured copper plate from mound c, Etowah group showing a human figure.

Later excavations in the Tumlin mounds, made by Dr. Roland Steiner, of Grovetown, Georgia, have brought to light other copper

¹ Fifth Annual (1883-84, figs. 42, 43, 44, and 45, pp. 96-106), Twelfth Annual (1890-91, plates xvii, xviii, and figs. 186-192).

² Figs. 240 and 241, pp. 886, 887.

³ Science, April 11, 1884.

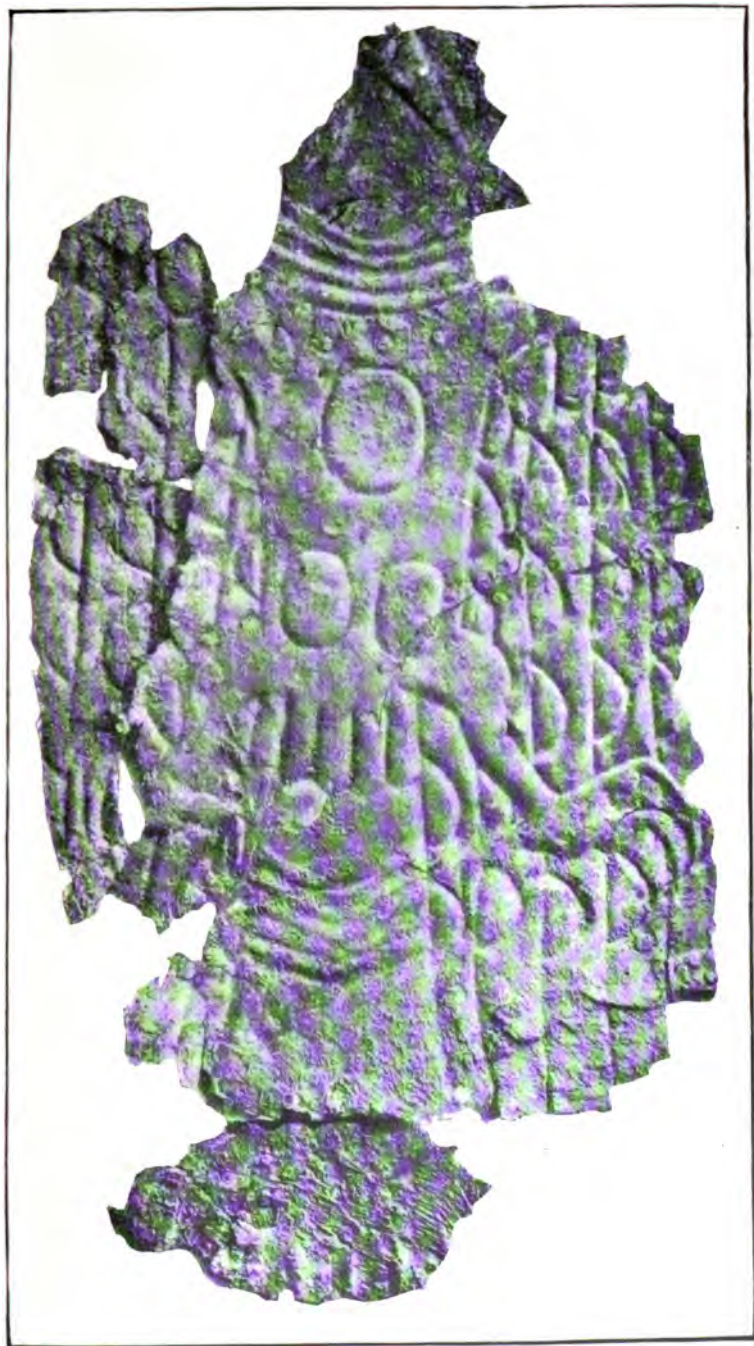


THIN COPPER PLATE, REPOUSSÉ, HUMAN FIGURE.

Mound C. Etowah group, Georgia.

Twelfth Ann. Rept. Bur. Ethnol., 1890-91, plate xvi.

Cat. No. 91117, U.S.N.M. $\frac{1}{2}$ natural size.

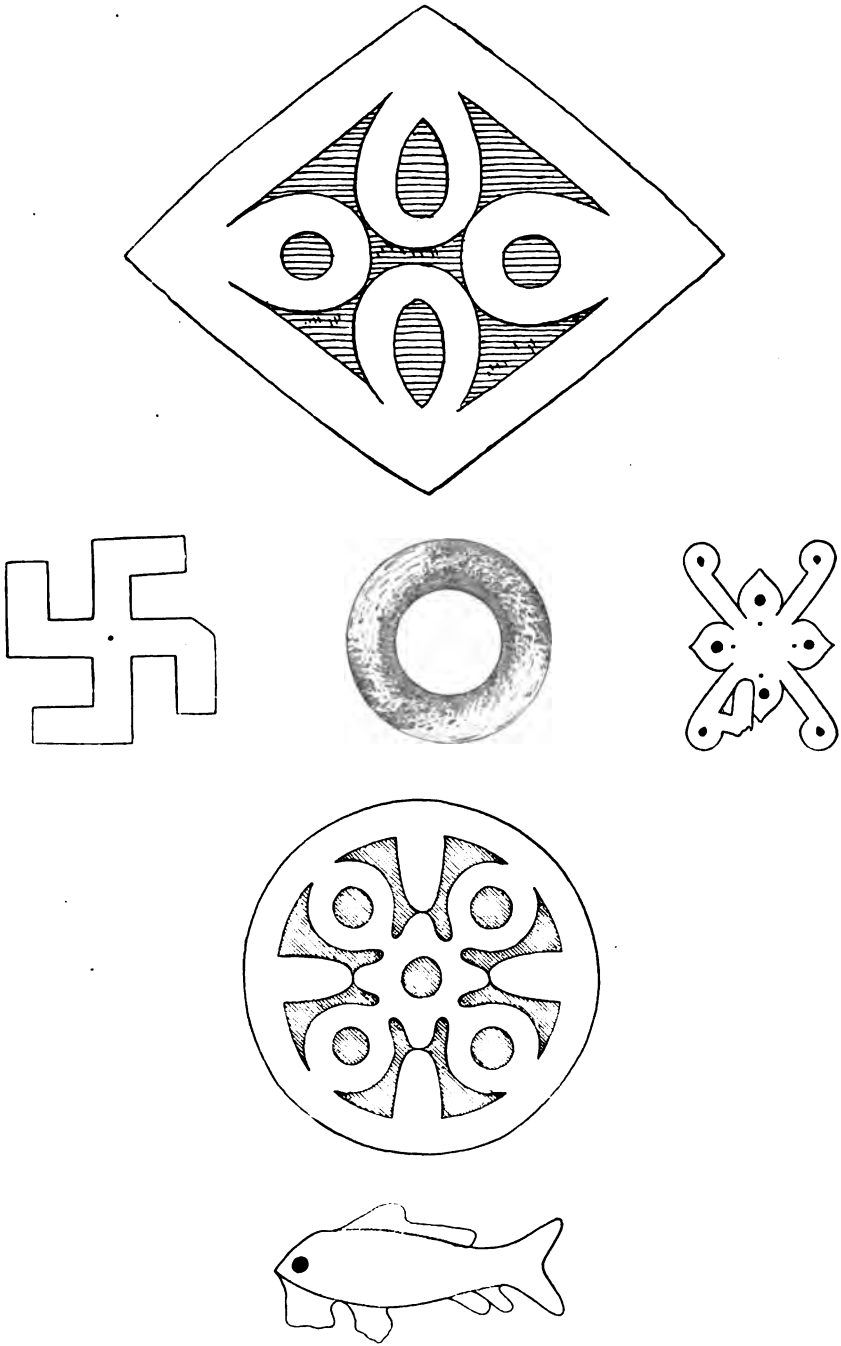


THIN COPPER PLATE, REPOUSSÉ, BIRD FIGURE.

Mound C, Etowah group, Georgia.

Twelfth Ann. Rept. Bur. Ethnol., plate xvii.

Cat. No. 91116, U.S.N.M. $\frac{1}{2}$ natural size.



THIN COPPER PLATES REPRESENTING VARIOUS OBJECTS.
Hopewell mound, Ross County, Ohio.
Originals in Field Columbian Museum.
Wilson, Swastika, figs. 244-249.



HUMAN SKULL WITH COPPER HEAD-DRESS (IMITATION ELKHORN).

Hopewell mound, Ross County, Ohio.

Original in Field Columbian Museum.

Wilson, Swastika, plate 13.

plates covered with repoussé work, though not of the same designs as the foregoing. The author would figure them on this occasion did not time press.

Other thinly wrought copper plates have been found in the interior States of the United States, notably Illinois and Ohio. Fig. 151 represents a copper plate taken from an Illinois mound, with an eagle or bird upon it. Fig. 152 represents another copper plate, also from Illinois, on which are two naked human figures in grotesque attitudes, as though of astonishment or fear.

Hopewell mound art.—The Hopewell mound, near Chillicothe, Ross County, Ohio, was excavated by Prof. Warren K. Moorehead for the benefit of the Department of Ethnology at the World's Columbian Exposition, Chicago. It was an immense construction, 530 feet long, 250 feet wide, with an original height of 32 feet, but when opened was only 16 or 18 feet to its original foundation. A considerable number of elaborately wrought copper objects were found at or near the bottom of the mound and in the center. Plate 61 represents most of these. All were flat, thin, smooth, though not polished, and had been cut into the various designs as represented. One of the objects is the swastika, of which five specimens were found; the rest were mostly geometric designs cut out of thin copper plates as shown.

There were no engravings or repoussé work on any of the copper objects found, with the exception of one, a spool or pulley-shaped ornament which was hammered and crimped as shown in fig. 153. Two other objects were found in copper, and are proper to be introduced on account of their art. Plate 62 represents

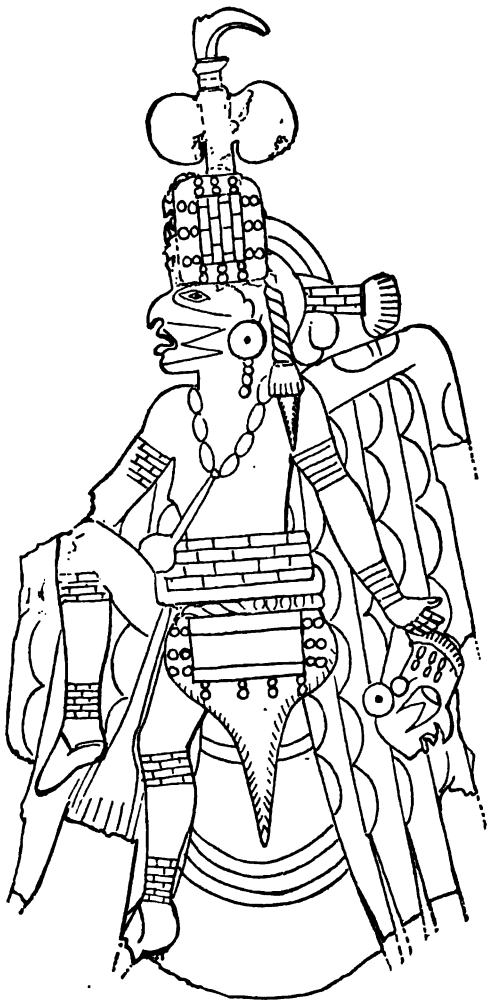


Fig. 150.

HUMAN FIGURE. THIN COPPER PLATE, REPOUSSÉ.

Mound C, Etowah group, Georgia.

Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890-91, p. 394, fig. 186.
Cat. No. 31113, U.S.N.M. $\frac{1}{2}$ natural size.

a human skull with a unique head covering made principally of copper. It consisted of a large sheet 16 or 18 inches long, intended to be bent

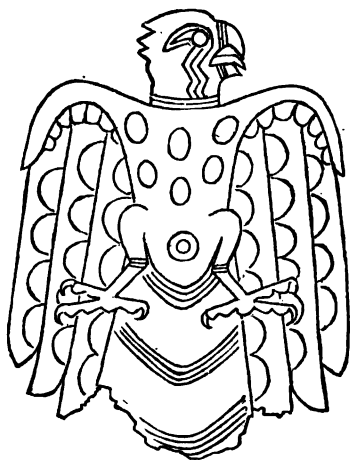


Fig. 151.

BIRD FIGURE. THIN COPPER PLATE REPOUSSÉ.

Mound, Union County, Illinois.

Thomas, Twelfth Ann. Rept. Bur. Ethnol., 1890-91, p. 309, fig. 192. Cat. No. 91507, U.S.N.M. $\frac{1}{2}$ natural size.

over the head, from the edges of which, about the center on either side, sprang a pair of imitation elk horns, as shown in the plate. They were not real elk horns, but had been carved out of wood to represent elk horns. The wood of the horns was entirely covered with thin sheet copper neatly and artistically placed so as to have the appearance of solid copper, and it was not until after a considerable examination that their real character was detected. The antlers were 22 inches high and 19 inches across the upper points. Plate 63 represents another object of a similar type from the same mound; it also is a copper head dress with two short rounded horns springing from the top as shown. They were also covered, but the copper had been broken from the top of the two horns, leaving the naked wood projecting. These latter figures are unique, and their right to a presentation in a paper on art lies in the excellence of the mechanical execution, and the difficulty of performing it. No one who has inspected these objects, and who considers all to have been aboriginal savage work, but would admit them to a place in a paper on prehistoric art.

Found in the same mound, and associated with the foregoing objects, was a piece of human bone (femur) which bore an engraved design, which is here reproduced (fig. 154) from the pamphlet of Prof. F. W. Putnam and Mr. C. C. Willoughby.¹ On this they based an elaborate system of symbolism, involving an explanation of the "Cincinnati tablet," previously mentioned (fig. 146, p. 491).

The Hopewell group of mounds was prolific in art objects and it made large and valuable contributions to American prehistoric archae-

ology.



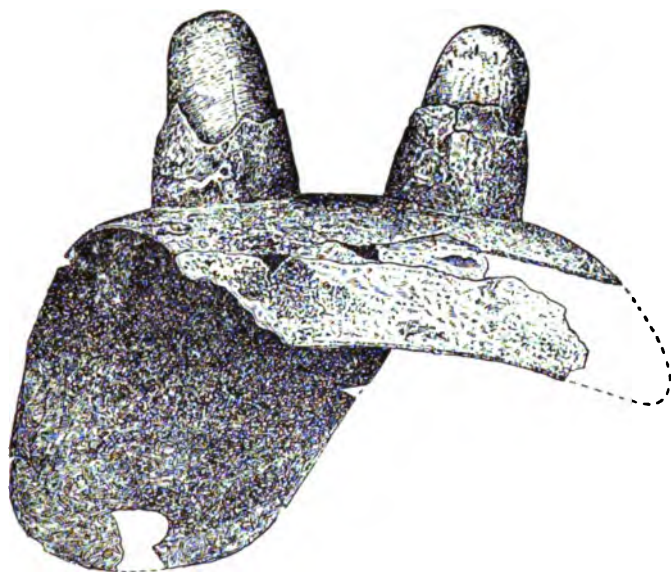
Fig. 152.

HUMAN FIGURES IN GROTESQUE ATTITUDE. THIN COPPER PLATE, REPOUSSÉ.

Union County, Illinois.

Thomas, Fifth Ann. Rept. Bur. Ethnol., 1883-84, p. 106, fig. 49. Cat. No. 88142, U.S.N.M. $\frac{1}{2}$ natural size.

¹"Symbolism in Ancient American Art," Proc. Amer. Assn. Adv. Sci., Springfield, Massachusetts, 1895.



COPPER HEAD-DRESS, SPROUTING HORNS.

Hopewell mound, Ross County, Ohio.

Original in Field Columbian Museum.

Putnam and Willoughby, *Symbolism in Ancient American Art*
(Proc. A. A. A. S., XLIV, 1896, p. 305, fig. 4).

ology. Many aboriginal carvings and engravings on bone were found during their excavation. Figs. 251-253 in "The Swastika"¹ represent variously carved birds and animals from these mounds. Other specimens were found, mostly in fragments, of which Mr. Bennett, the artist of the expedition, says:

These carved traceries or engravings upon bone, even in fragmentary state, evince an artistic aptitude much beyond the mineral and vegetable stain, and, by their almost microscopic delicacy of execution and unflinching precision of line work, show a high degree of manual skill. Though some are undoubtedly portions of barbaric and desultory design and unsystematic application of indefinite ideas, others bespeak a clearly conceived idea, a definite motive and vigorous execution, not inferior to the predominant motives of early Mediterranean decorative art.

They are clearly not of an illustrative or imitative design, either realistic or conventional, but created design, founded on purely mechanical motive with good conception; and it is regrettable that no complete examples remain to correct artistic valuation of the purpose of the whole.²

The recent excavations by Mr. Clarence B. Moore in the Florida sand mounds brought to light several of these thin copper plates with curious designs wrought upon them.³ The United States National Museum possesses a number from various States in the central United States. The designs, however, are not of the same character as most of the foregoing. They do not represent human or animal figures, but tend to lines, dots, concentric rings, and designs more or less geometric.

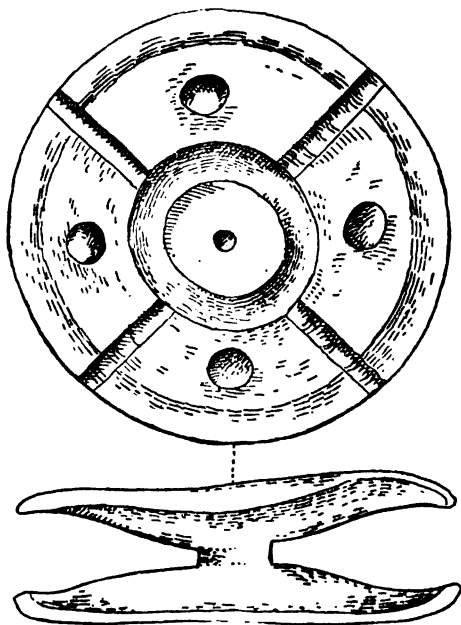


Fig. 153.

SPOOL OR PULLEY-SHAPED EAR ORNAMENT, COPPER.

Hopewell mound, Ross County, Ohio.

Wilson, Swastika, p. 891, fig. 250. Natural size.

GOLD AND SILVER.

The world knows enough of the barbarous peoples of historic times, whether ancient or modern, to enable it to predicate with reasonable certainty the use of gold and silver for personal adornment among the

¹ Wilson, Report U.S.Nat.Mus., 1894, pp. 757-1011.

² "Hopewell Group," Warren King Moorehead in The Antiquarian, July, 1897, p. 179.

³ Journal of Academy of Natural Sciences of Philadelphia, X. The specimens are in the museum of the Academy of Natural Sciences in Philadelphia.

peoples of prehistoric times. Prehistoric archaeologists have had their attention directed to these precious metals, and accordingly have sought for them when excavating prehistoric settlements. It is not intended in this paper to give a full or even reasonably complete list or description of finds of gold or silver. Only enough will be presented to show the character and style of the art work and the capabilities of the artists.



Fig. 154.

AN INCISED CARVING ON
HUMAN FEMUR.

Hopewell mound, Ross
County, Ohio.

Putnam and Willoughby, *Syn. Anc.
Amer. Art.* (Proc. A. A. A. S., XLIV,
1896, p. 3/2, fig. 1. $\frac{1}{2}$ natural size.

One of the collars was sold to M. Costa de Beauregard (Haute-Savoie), but the other was kept by Lebail at his hostelry as an attraction to visitors. Lebail was succeeded by his son-in-law, M. Felix Gaillard, now the inspector of prehistoric monuments for his neighborhood, and he has greatly increased his collection. Among other specimens are two gold bracelets, one of which is represented in fig. 156, found in a dolmen near Belz (Morbihan), and a finger ring from the department of Ille-et-Vilaine.

EUROPE.

Brittany.—The use of gold can be traced in western France through the Neolithic period, principally in the form of collars and bracelets. Fig. 155 represents one of these collars. It was found in one of the dolmens of Roc'h-Guyon or Rondessec, at Plouharnel-Carnac (Morbihan). The discoverer was M. Lebail, the keeper of the hotel at Plouharnel, where the author spent some months at various times in prehistoric investigations, visiting this monument upon sundry occasions. The ornament is native gold, about an inch and a half in width, and cut longitudinally into a dozen strips extending one-third the way round. This might have been done by a sharp flint, used chisel and not saw fashion. There were two of these collars, each weighing about 140 grams. They had been intentionally deposited in a rude pottery vase with cinders, ashes, and charcoal, which had been walled up in one corner of the chamber.

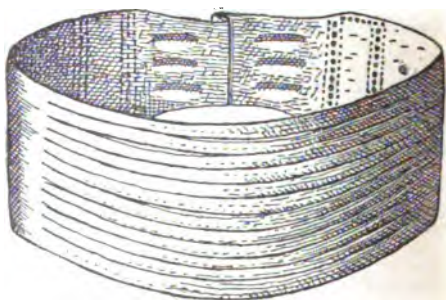


Fig. 155.

GOLD COLLAR.

Dolmen at Plouharnel-Carnac.

Original, collection Gaillard, Plouharnel-Carnac, Morbihan, France.
 $\frac{1}{2}$ natural size.

While it is not asserted that the working of gold was carried on in the Neolithic period, yet the foregoing patterns are different from most of those of the Bronze age. Many, apparently belonging to the Bronze age, are simply round rods or bars of gold of sufficient length to encircle the wrist, and which have been bent to that form (fig. 157). Others have been made into thin sheets, crimped around the edges (fig. 158). Both these



Fig. 156.

GOLD BRACELET.

Dolmen near Belz, Morbihan, France.

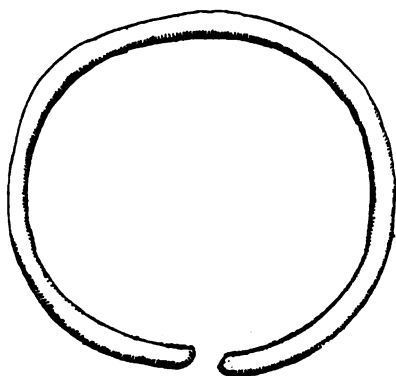
 $\frac{1}{2}$ natural size.

Fig. 157.

BRONZE BRACELET OF ROUND ROD, THE COMMONER PRIMITIVE FORM IN BRONZE AND COPPER THROUGHOUT THE WORLD.

 $\frac{1}{2}$ natural size.

styles are identical with the bronze bracelets, and the places in which they were found and the objects with which they were associated concur in their assignment to the Bronze age. There are also many objects in gold—torques and bracelets—which show a different method of working, and are supposed to have been of later date. Some were round, heavy, decorated, marked with zigzag, herringbone, chevron, etc. (fig. 159, *a, b*), some of them after the fashion of a coil of rope (fig. 160, *a, d*), in others the ends were hammered square and enlarged (fig. 160, *b, c*).

Ireland.—The Archæological Museum in Dublin is probably the richest in gold objects of any in Europe. One of its attractive displays

is a series of bracelets, running from extremely large to extremely small. They consist of a rod of gold, larger in the center, tapering gradually to the ends, but with a head hammered down and spread, the ends being then brought more or less together (fig. 161). In the larger of these the rod would be nigh half an inch thick, and from that down. Some are large enough to go over the hand and so be worn on the wrist, or even on the arm, while the smaller ones in the series would not go on the little finger.

The evident fact that these small ones, though practically reproductions of the larger, are quite too small for any possible use as bracelets or

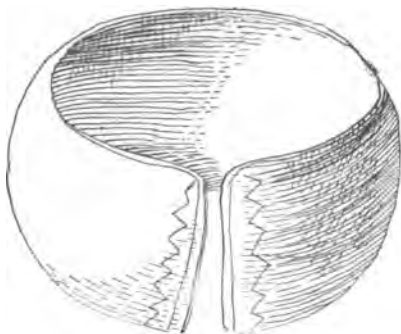


Fig. 158.

BRONZE BRACELET OF THIN METAL WITH CRIMPED EDGES.

Standard style during the bronze age in Europe. $\frac{1}{2}$ natural size.

rings, and the additional fact that in some of the countries on the west coast of Africa manillas somewhat resembling these have been used as currency, has caused it to be said that these were not bracelets, but were money, and the name of ring money has been given to them. It is evident that these latter specimens belong to later prehistoric peoples. In Ireland these have been called Celtic; in France, Gaulish.

Laissegraisse.—Fig. 162 represents one of these Gaulish torques or collars, while fig. 163 represents a bracelet. They are both of the same style, and were found about 1885 in the little hamlet of Laissegraisse, department of Tarn, France, by a peasant while digging in his vineyard. The author happened at that time to be in the city of Toulouse, and accepted the kind offer of M. Cartailhac to visit the locality and inspect the objects. They were found at about 18 inches beneath the surface, just below the ordinary reach of plow or mattock, and it was only an

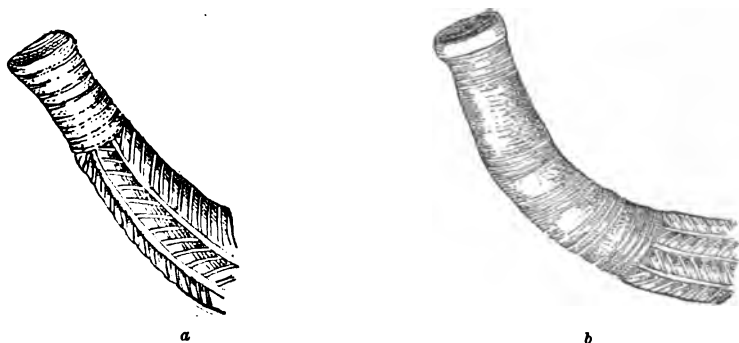


Fig. 159.

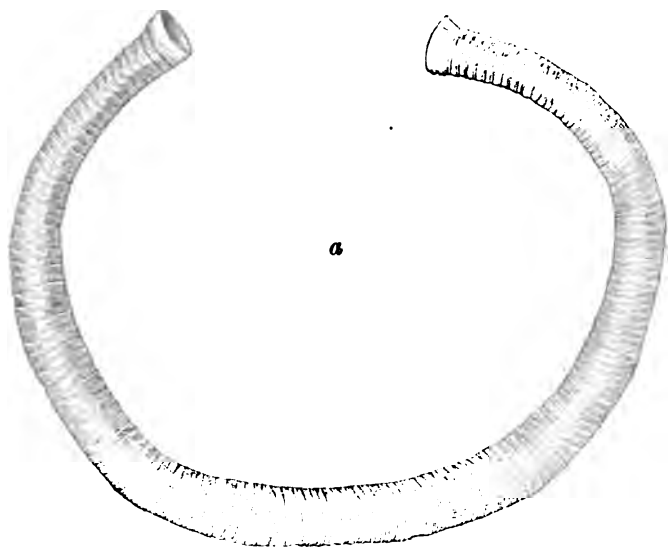
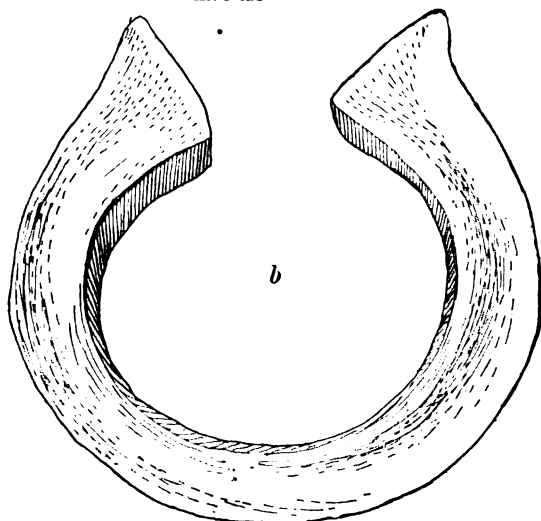
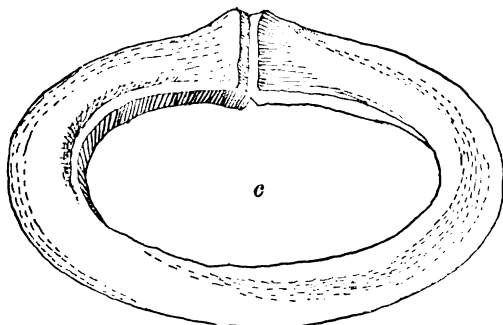
ENDS OF HEAVY BRACELETS, ARMLETS, TORQUES, ETC., IN GOLD OR BRONZE, SHOWING STYLE OF DECORATION.

Europe.

$\frac{2}{3}$ natural size.

extraordinary and accidental stroke of the latter that showed a brilliant spot at the bottom of the hole. There were evidences of prehistoric man in the shape of flints more or less worked, fragments of pottery and bits of charcoal, but none had any particular relation to the gold objects. They were not protected by box or inclosure in any way. It will be seen from their work that they had been highly decorated, made in repoussé, and soldered together. The details of the ornaments (fig. 164, *a*, *b*, *c*) and the mode of fastening (fig. 165, *a*, *b*, *c*) evince a fair degree of civilized mechanical skill in their execution.

Golden cinctures have been lately (1893) found at Contras, and are now in the Museum of Bordeaux. They are simply twisted coils with large button-like ends. Industrially they resemble those from Laissegraisse, but artistically, they are much inferior. They were found *en cache*, forming part of the stock of a goldsmith or a mint worker, comprising about four hundred pieces, weighing nigh 10,000 francs in gold.

*a**b**c*Figs. 160 *a*, *b*, *c*.

GOLD TORQUES, COLLARS AND BRACELETS.

Vieux-Bourg Hinguet (Côtes-du-Nord), France.

a, $\frac{1}{2}$ natural size. *b*, *c*, $\frac{2}{3}$ natural size.

The manufacture and use of gold ornaments continued in these two countries, Ireland and France, to a much later date. An inspection

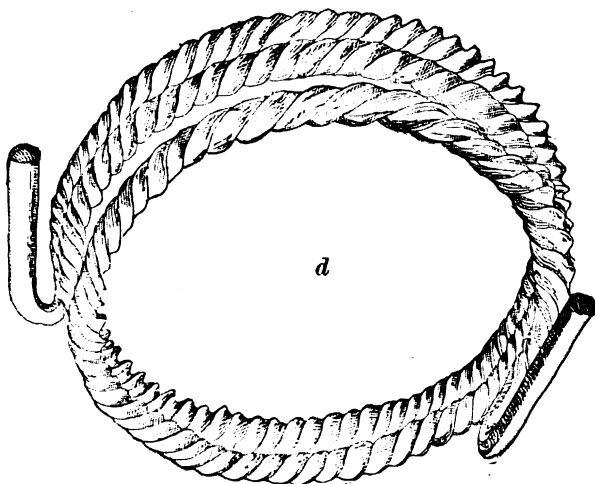


Fig. 160 d.
GOLD TORQUE.
Weight, 389 grams.
Rennes (Ille-et-Vilaine), France.
Musée Cluny. $\frac{1}{2}$ natural size.

of the beautiful objects of precious metals in the museum at Dublin will show the Celtic work improving in mechanical skill and artistic design until 1000 or 1200 A.D. Mr. Edmund Johnson, an accomplished jeweler and goldsmith in Dublin, made a reasonably complete series of reproductions of these objects which he displayed at the World's Columbian Exposition, Chi-

cago. In France the advent of the Romans changed the style of art in precious metals. The golden patera of Rennes, with its fibula and chain, belonging to the third century A. D., were all high Roman art. It has been described by the author.¹

AMERICA.

The North American Indian does not, during prehistoric times, appear to have worked or used gold or silver for either ornament or utility. There have been a few pieces of silver found within the district occupied by him, but all, either from their association or mode of manufacture, have suggested European influence. The pieces of gold found within this district are much fewer in number and are subject to the same remark.

Whatever criticism or denial may be made of the foregoing statements in the interest of civilization or technology, yet it stands practically true in its relation to art work.



Fig. 161.
GOLD BRACELET, ONE OF A SERIES FROM LARGE TO SMALL.
Museum of Science and Art (Archæology), Dublin, Ireland.
 $\frac{1}{4}$ natural size.

¹ Report U. S. National Museum for 1894, pp. 609-617.



Fig. 162.

GOLD TORQUE, GAULISH.

Laissegraisse (Tarn), France.

Musée Toulouse. $\frac{1}{2}$ natural size.

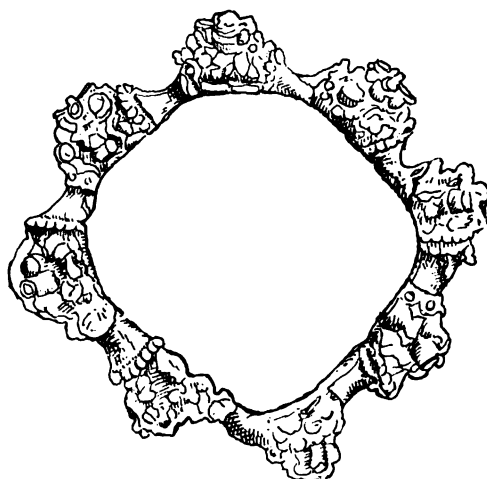


Fig. 163.

GOLD BRACELET.

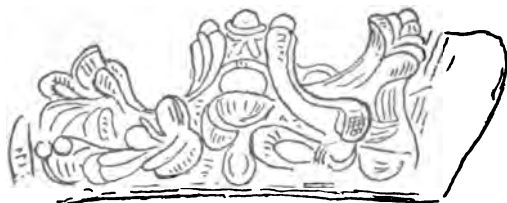
Laissegraisse (Tarn), France.

$\frac{1}{3}$ natural size.

Mexico, Central and South America.—But going southward through Mexico into Central and South America the affair becomes changed. We all know, from the Spanish historian and discoverers, how the Conquistadores, as soon as arrived on the shores of the Western Hemisphere, began the mad search for gold. The Spanish adventurers who landed within the territory now occupied by the United States, like



a



b



c

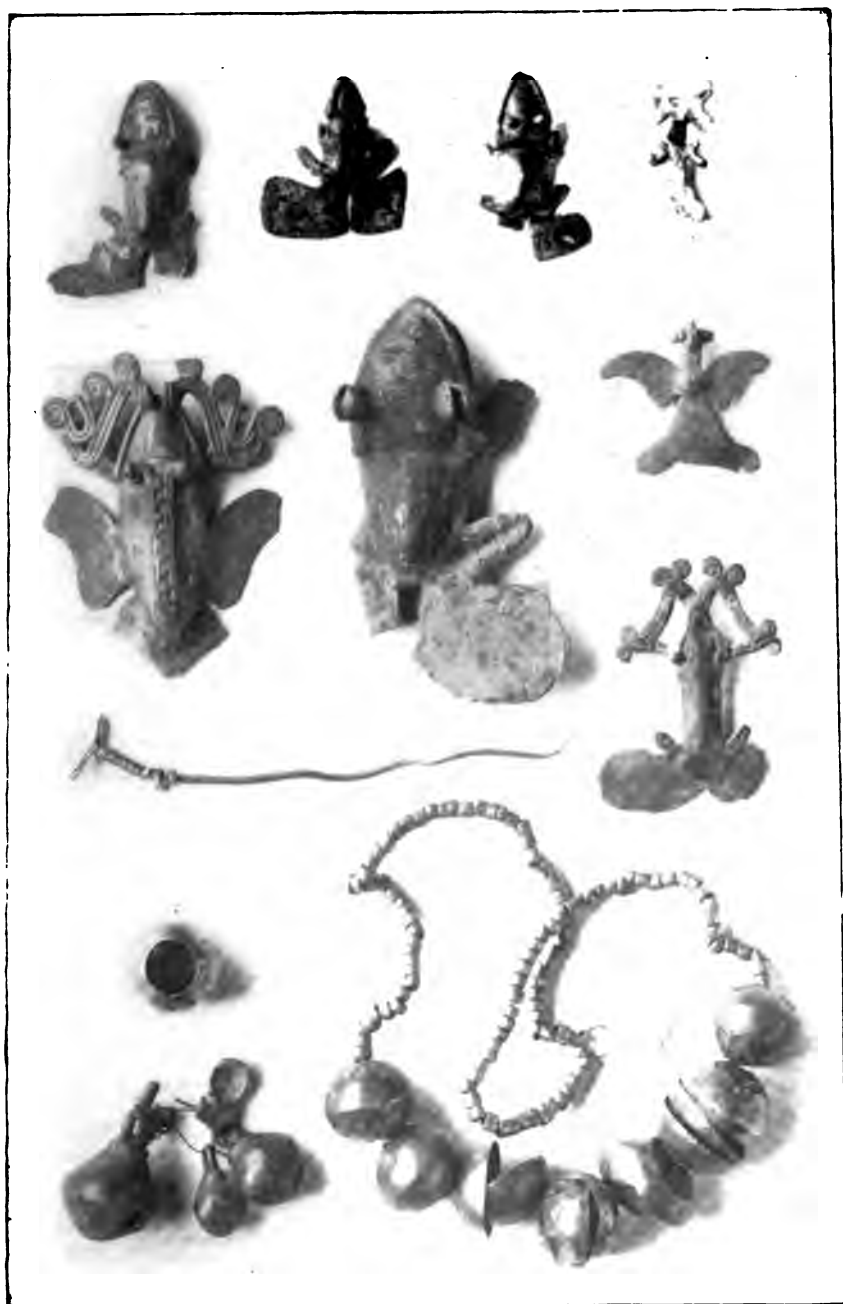
Fig. 164.

DETAILS OF THE ORNAMENTATION OF FIGS. 162, 163.

Natural size.

Ponce de Leon and De Soto, give frequent descriptions of gold and copper; the latter appearing in great plenty, the former much less, and the similarity of appearance being such that, in the paucity of their communicating languages, they were unable to distinguish the differences between the two metals.

Plate 64 represents certain gold objects in the United States National Museum from Chiriqui, and plate 65 represents a similar set from Antio-



GOLD OBJECTS FROM CHIRIQUI, COLOMBIA, SOUTH AMERICA. STRING OF BEADS AND BELLS AT BOTTOM ARE FROM PERU.

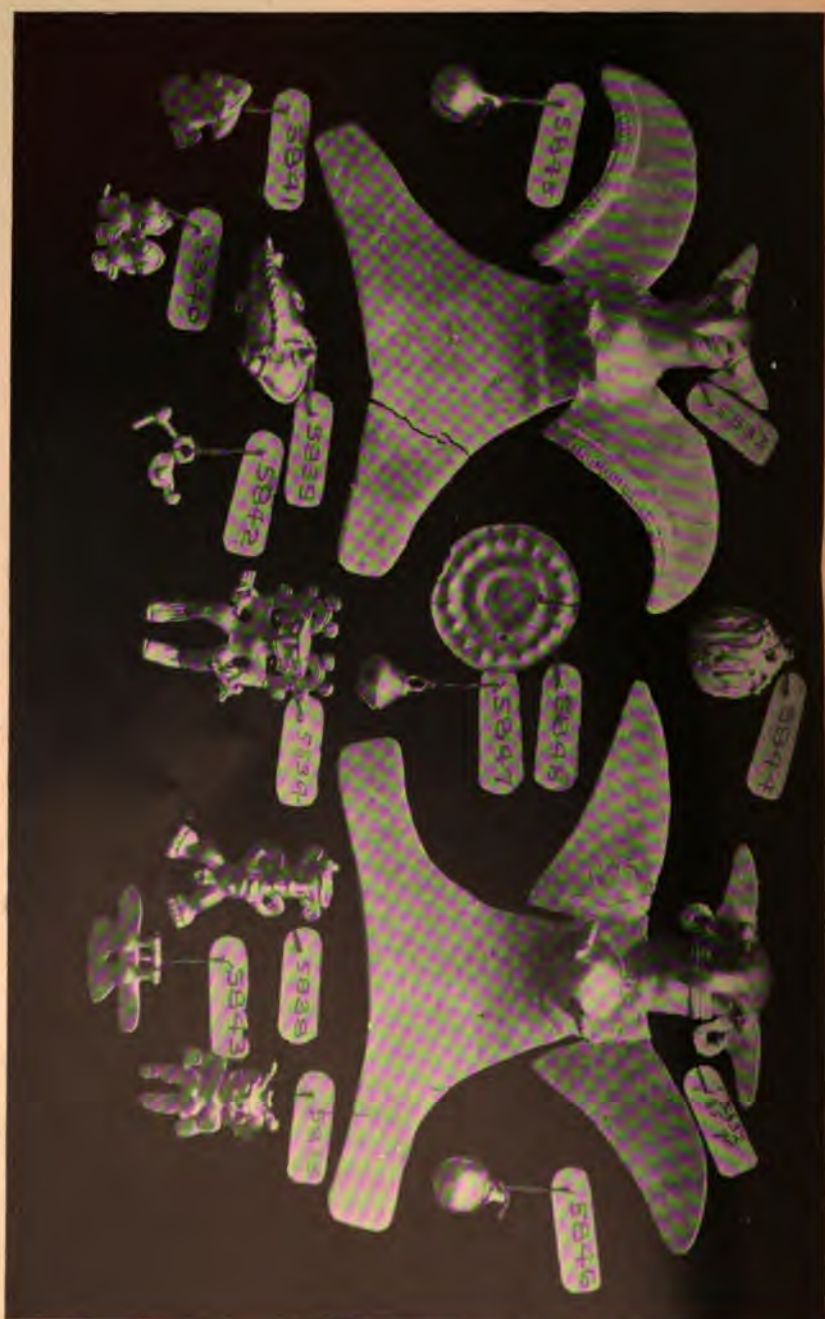
Cat. Nos. 148148-148172, U.S.N.M. ‡ natural size



GOLD OBJECTS FROM QUIMBAYA, ANTIOQUIA, COLOMBIA, SOUTH AMERICA.

Some are casts and some originals.

Cat. Nos. 147738-147746, U.S.N.M. $\frac{1}{2}$ natural size.



GOLD ORNAMENTS, FROM COSTA RICA.
 Originals in National Museum, San José.
 1 natural size.



GOLD OBJECTS.

Chibchas.

Ruiz-Randall collection, from Bogota, Colombia, South America. $\frac{1}{10}$ natural size.

quia, both in Colombia, South America. Plate 66 represents a chosen collection of gold ornaments from Costa Rica, from a photograph furnished by Señor A. Alfaro, the objects being from the Costa Rican Museum. The art of gold working is shown by the objects in the plates and does not require lengthy or detailed description. Plate 67 represents a series of gold objects reported from the Chibcha tribe of Indians, Bogota, Colombia, belonging to the Ruiz-Randall collection.¹

It is not necessary to discuss the question of art any further in this connection, especially as has been mentioned in the introduction, it has been treated in its relation to certain materials by various persons,

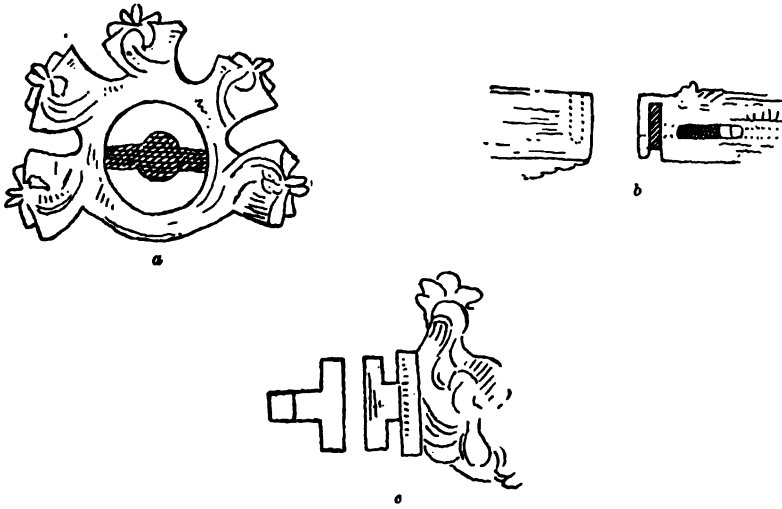


Fig. 165.

DETAILS OF MODE OF FASTENING COLLAR AND BRACELET, FIGS. 162, 163.

Natural size.

especially by Prof. W. H. Holmes, formerly of the Bureau of Ethnology, equally renowned as an archaeologist and as an artist, and by his familiarity with these two subjects is probably as well qualified to deal with it as any one in the United States.

Since the preparation of this paper the following volumes on aboriginal art in North America have been published: "Decorative Art of the Indians of the North Pacific Coast," by Franz Boas, in the *Bulletins of the American Museum of Natural History*, Vol. IX, Article X, pp. 123-176, New York, May 24, 1897; and "The Graphic Art of the Eskimos," by Walter James Hoffman, M. D., in *Report of the U. S. National Museum*, 1895, pp. 739-968.

¹ *Century Magazine*, October, 1891, XLII, No. 6, pp. 879-892.

III. PREHISTORIC MUSICAL INSTRUMENTS.¹

Music is a dualism. It is formed of the conjunction of two elements; the one purely musical, the other poetical; the one sensuous, the other spiritual or intellectual; the one owing its origin and development to instruments and based on the mere animal delight in sound, the other owing its origin and development to language and based on the fusion of the emotional and intellectual sides of man's nature.²

It has been asserted that the origin of vocal music was coeval with that of language, and that the construction of musical instruments dates with the earliest inventions suggested by human ingenuity. Those who make these assertions do so simply upon theory, and when pressed for their authority would be compelled to admit that actual knowledge or information upon the subject does not exist. What can be affirmed is that sound made by the prehistoric man of the earliest epoch might have been rhythmic and so possessed one of the elements of music. The other elements—melody, dynamics, and harmony—followed in the course of civilization, among some people at a faster and among others at a slower rate.

Vocal sounds are incapable in themselves of perpetuation. When the vibrations made by the human voice have ceased, the incident is closed and the evidence lost. It is, therefore, in the absence of any written testimony, impossible to identify the practice, or even the existence, of vocal music in prehistoric times. We are driven to an exclusive consideration of musical instruments, and if these should fail us, we would be without evidence.

Miss Fletcher³ says:

As to the birth of musical instruments, I can not even touch upon the *raison d'être* of their invention, but I may call attention to their controlling influence; they have become at length master of the man who made them. There is no race or people possessing a theory of music who have not been indebted to musical instruments for the means by which their theory has been worked out. * * * Before the instrument had been evolved and man could listen objectively to his music, during the long period when his voice was his only mode of expression, his mind was not stimulated to make observations upon the relations of one to the other. He may be said to have possessed no conscious method and to have followed no known or accepted artificial rules of composition of his song.

This relates entirely to prehistoric times, and its author accepts musical instruments as the only means of perpetuating the sounds so they can be reproduced and studied.

¹Much of the material descriptive of prehistoric musical instruments and their scales in the Western Hemisphere contained in this chapter was prepared by Mr. E. P. Upham, assistant in the division of Prehistoric Archaeology to whom credit as joint author should be given.

²Rowbotham, *History of Music*, I, Introduction, p. xi.

³Indian music, in *Music*, June, 1894, p. 189.

It is the intention in this chapter to leave aside all speculation as to the origin, theory, practice, philosophy, and poetry of music, and to deal only with music as one of the fine arts of prehistoric times; the study thereof to be based upon such knowledge as is obtainable from prehistoric musical instruments.

There have been some students, even some professors, who, wiser than their own generation, declare music to be a manifestation of an innate principle in man. The author does not contradict the proposition, but he denies the knowledge and authority of these wise men who say so.

While the proposition may be true, yet the statement is valueless, because it is only the assertion of these gentlemen, the truth of which they do not know. It is, on their part, theoretical, and an assumption which should be proved before being stated as a fact. It is a *a priori* argument, and as such is vicious. Investigation has demonstrated that similar assumptions have been erroneous. Illustrations of this can be shown in the life history of Paleolithic man, deduced from discovery. No person would be justified in the assumption, without proof, that the man who lived in caves and apparently had no more notion of civilization than the wild beasts with which he disputed the possession thereof, who knew only to use stone implements, and these made sharp by chipping, and who did not know to rub one stone against another to make it either smooth or sharp—no person would be justified in assuming that this man was capable of making artistic designs representing almost the entire fauna of his district; yet in an earlier portion of this paper we have seen that he did this thing. It has been said or assumed, without knowledge for foundation, that man in his earliest condition had an appreciation of the rhythmic character of music; but, in opposition to this, we will show that this same Paleolithic man, who developed an artistic taste in such high degree, had no taste for and did not employ even the rhythmic principle of music. The most we have found of his ability in this direction was the simple whistle, made from the phalange of the reindeer (p. 524). While it is not impossible that this might have been used in cadence and for rhythmic representation, yet there is no known fact on which to base the belief. No reason has been given, and I take it no reason can be given, for these manifestations on the part of the early man in favor of one kind of art and not of another kind. This becomes less subject to the *a priori* theory herein denounced when we consider that to a large extent the contrary appears in the higher civilization of the Neolithic period, which follows the Paleolithic.

The object of this paragraph is to protest against the *a priori* method of argument so often used by the student or professor who, studying or knowing the instincts or capabilities of modern man, argues therefrom that man in a state of nature did the same. It is not denied

that one people may have developed its culture in one direction and not in another, even retrograded in some respects while they advanced in others, but no person is justified in assuming that, because one primitive people developed their civilization in a particular direction, therefore all peoples did the same. The unity of human development and civilization is a myth. We have but to look over the modern world and to compare the peoples of historic times, some of them of high civilization, to demonstrate this want of unity. It is sufficient as an illustration to cite the different families of the Aryan race, which originally had a single stock of language if they did not have a single stock of blood; then compare these families together and note the differences in their civilization, the Greeks with the Romans, and they with the Celts, and the Celts with the Goths, and so on to the Lets and the Slavs, and all these with the Zends and Persians. If this comparison be somewhat difficult and not apparent at a glance, we may take the descendants of these various peoples as they exist at the present time; compare not simply the Latins with the Germanic peoples, but the Latins with themselves; the differences between Italy and France, and of France with Spain, or the ancient Saxon with the Anglo-Saxon of England. These differences are almost as great as though there never had been any relation between them; almost as great as it is between these Aryan peoples and the Semitic, between whom there has never been any racial relation. These differences apply to their fundamental civilization and ramify through every fiber of the respective bodies politic. In sociology the distinctions in religion, marriage, government, law, inheritance, is as great between Italy, France, and Spain on the one hand, and Germany, Holland, and England on the other, as it is between either or all these and the same institutions in China and Japan. He would be a poor historian who, proceeding upon the theory of the similarity of human nature, and having written a history of any one of the nations and peoples just mentioned, should assume that, therefore, he was in possession of knowledge of the sociologic conditions of any other. It is useless to continue this argument. Its only purpose has been to enter a protest against this method of reasoning when applied to the prehistoric peoples of whom our only knowledge consists of such monuments, tombs, residence sites, implements, utensils, and objects as have been or may be found on or in the earth.

Rhythm was the first element of music. The drum and the rattle of the savage give forth but one tone, and all their music consists in strokes or shakes, repeated at greater or less intervals of time and with more or less regularity and force. The earliest prehistoric whistles gave but a single note, but were afterwards increased to two and five notes, and while they could increase the force they were scarcely able to make a melody except of the most simple kind. Drums and rattles

might have had a different pitch and have given different notes, but there is nothing to show that they were intentionally so. It is much more probable that they were made to produce tones of strength, clearness, sweetness, etc. When prehistoric man understood and attempted to make melody he had advanced one grade in culture.

Frequent attempts have been made to give written representations of the rude music heard among savage or barbarous nations, but these should always be received with distrust, not so much from want of confidence in the observers as from want of accurate representation of sounds heard. The usual practice is to try to write the sounds according to our modern musical notation, but it must be borne in mind that this notation only corresponds with our own peculiar scale, which has no signs to represent other sounds. Hence, when we see the chants of a savage tribe expressed in our notation we should not take it for granted that they actually used the intervals of our scale. We can only assume that the observer wrote something as nearly like what he heard as he could find means of expression.

In the music of savage tribes they used a few sounds, differing in pitch, but in most cases there is no sufficient reason to believe that these sounds correspond, as regards their gradations, with any regular musical system. To get traces of such a system we must look to peoples more civilized, and we soon find not only a considerable advance in the knowledge of the sounds used, but, what is of more importance, a more accurate definition of them. This definition is aided when, as often happens, they have introduced musical instruments with fixed tones.

There has been much speculation among philosophers and scientists as to the origin of music. Charles Darwin, Herbert Spencer, Letourneau, De Mortillet, and others agree that music originated with the cry of the human voice, and that it developed from vocal noises. Letourneau continues the simile by suggesting that the noises of nature were the originators of musical instruments. The others treat of vocal music, and their investigations and theories are devoted almost exclusively to an explanation of its origin. Darwin and Spencer differed as to the particular class of vocal noises which served as the origin of music. Darwin attributed it to the amatory class, that is, those sounds which the male makes during the excitements of courtship and in order to charm the female, and he thought that not only love music, but music in general was the resulting combination of these sounds. Spencer disagreed with the latter reason and was of the opinion that music had its germs in the sound which the voice emits under excitement, and that it eventually obtained its particular character according to the kind of excitement. Darwin, true to his development theory, believed that "the vocal organs were primarily used and perfected in relation to the propagation of the species." Spencer, agreeing to the excitement

of love as a partial cause, extends it to include all other excitements to which animal feelings are susceptible.

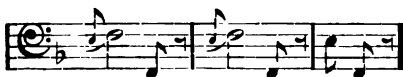
The infantile cry, which it is said was the origin of music, has been reduced to writing and placed in the form of notes on the staff.



CHILD CRYING.

Rossini, in his opera of "Semiramide," introduced into one of the choruses with great effect the cries and squeals of a party of children.

As the human cry grew it changed to represent passion, and possibly by onomatopoes it became articulate and so grew into language. With this came modulations of the voice, and Didero, with the others, says the cry of an animal in passion was the fundamental principle of music. Some animals, especially birds, have the power of music without language, but it is claimed that they can express by their music the same sentiments of passion as does man. It has, therefore, been declared that music does not belong exclusively to man, and it is certain that it exists among animals independent of articulate language. An observing student of nature, Mr. A. T. Camden Pratt,¹ has reduced some of the cries of our domestic animals to form, and has written them out in music.



BULL BELLOWING.



COW LOWING.



HORSE NEIGHING.

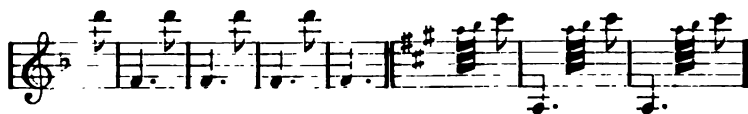


DOG YELPING.

¹Strand Magazine, December, 1893, and January, 1894.



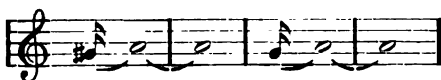
DOG BARKING FOR JOY.



DONKEY BRAYING.



GRASSHOPPER CHIRPING.



GNAT BUZZING.

Modern musical works not infrequently reproduce the songs of birds. "Listen to the nightingale" is an illustration which, however, only serves to show the superiority of the bird over his brother animal, man. The lark, the blackbird, the thrush, all have their songs, which, repeated again and again, are recognizable and known of all men, while the canary, the mocking bird, and the catbird sing not only their natural songs, but can be taught to sing many variations, if not to execute entirely new melodies. The author has seen a piece of music set to imitate a cackling hen and crowing cock, and all the world remembers Ole Bull's "Barnyard orchestra," as played on his violin. Darwin reports to have heard a gibbon which modulated his voice to the extent of an octave, and, according to Savage, the black chimpanzee (*Troglodytes niger*) gathers in troops at certain places and gives musical concerts by striking wood of various kinds—that is to say, trees standing, logs lying, or branches spreading—with a rod or pole, keeping time and forming a sort of melody or harmony of the different tones emitted from the object struck. If this be true these would seem to be musicians in the lowest scale and this to have been the most primitive musical instrument.

Musical instruments of percussion are the most simple, and the theory has been accordingly announced that they were the first to have been invented—that is, they were the earliest factors in human culture, and the first to be used among primitive peoples. The next in order of complexity, and accordingly in order of invention and evolution, were wind instruments. Rowbotham¹ divides them into types, of which his representatives are the drum, the pipe, and the lyre. Under

¹ History of Music, Book I.

the first head fall rattles, gongs, triangles, tam-tams, castanets, tambourines, cymbals, all instruments of percussion; under the second head fall flageolets, flutes, hautboys, clarionets, bassoons, bugles, all wind instruments; under the third head fall all stringed instruments. He makes these types representatives of three distinct stages of development, through which, in the order named, he says, all prehistoric music has passed. "As in the geologic history of the globe the chalk is never found below the oolite, nor the oolite below the coal, so in the musical history of mankind is the lyre stage never found to precede the pipe stage, nor the pipe stage to precede the drum stage. In keeping with this is the fact that the savages sometimes have the drums alone, but never the pipe alone, or the lyre alone, for if they have the pipe they have the drum too, and if they have the lyre they always have both the pipe and drum."

Pursuing this idea, Rowbotham¹ devotes many pages to descriptions of "savages," who are in the respective stages of musical culture just described, and he gives the author or book from which he has obtained the information:

Savages with no instruments:

Veddahs of Ceylon: Tennent's History of Ceylon.

Minicopies of the Andamans: Mouat's Andaman Islands.

Inhabitants of Terra del Fuego: Narrative of the Surveying Voyages of H. M. SS. *Adventure* and *Beagle*. II.

Savages with only the drum:

Australians: Eyre's Discoveries in Central Australia, II, pp. 228, 2, 237, 32, 331; Grey's Journal of Two Expeditions of Discovery in Northwest and West Australia, II, p. 305.

Eskimos: Parry's 2d Voyage, p. 530; Crantz, History of Greenland, I, p. 171.

The Behring's nations generally: Whymper's Alaska, p. 143, particularly the Malemutes and Kaveaks.

Samoyedes and other Siberian tribes: Richardson's Polar Regions, p. 335;

Smith's Wonders of Nature and Art, London, 1803, II, pp. 277, 264, etc.

Laplanders—until within 200 years: Scheffer's History of Lapland, p. 58.

Savages with pipes and drums:

Polynesian Malays: For the Society Islands, see Captain Cook's Voyages, published by John Tallis, I, p. 87. For the Navigator Isles, Turner, Nineteen years in Polynesia, p. 211. For the Friendly Isles, Cook, I, p. 427, and in the common edition, 1st Voyage, p. 397; see also Mariner's Tonga Islands, II, pp. 214, 218. For the Marquesas, Melville's Life in the Marquesas, p. 185. For the Sandwich Islands, where, however, the pipe is absent, Cook, II, p. 250. For the Maories of New Zealand, who are the most advanced of all, Captain Cook, I, p. 196, and generally Ellis's Polynesian Researches, p. 282.

Papuans: Williams's Fiji and the Fijians, I, p. 163; Turner's Nineteen Years in Polynesia, p. 90; Jukes's Voyage of H. M. S. *Fly* (for the Erroob Papuans), II, p. 176; (for the Papuans of New Guinea), I, p. 274, and plate I, p. 277; see Rosenberg's New-Guinea, p. 93. And for the Drum Form in the Papuan Archipelago, Shouten's Voyage in Purchas His Pilgrimes I, 2, 100.

Upper Amazon: Bates's Amazons, II, p. 201; Wallace's Travels on the Amazon, p. 504.

Rio Negro: Wallace's Travels on the Amazon, p. 259.

¹ History of Music, I, Introduction, pp. xiii, xiv, xv.

Savages with pipes and drums—Continued.

Uaupés: *Ibid.*, p. 282.

Tupis: Bates's *Amazons*, I, p. 311.

Omagnas: Southey's *History of Brazil*, I, pp. 89, 90.

Neighboring Tribes: *Ibid.*, pp. 84, 95; Orellana, in his narrative of his expedition down the Marañon, says, "had 3-stringed rebecks."

Artaneses: Southey, I, p. 139.

Yucanas: *Ibid.*, III, p. 720.

Itatines: *Ibid.*, I, p. 341.

Generally the rest of the Brazilian tribes: *Ibid.*, I, p. 206.

The Aymara Indians of Bolivia and Peru: Forbes, *On the Aymara Indians*, in *Transactions of the Ethnological Society for 1869*, p. 233.

The aborigines of Guiana: Brett's *Indian Tribes of Guiana*, pp. 154, 320 (plate).

Huacho Indians of Peru: Stevenson's *Travels in South America*, I, p. 403.

Abipone of Paraguay: Dobrizhoffer's *History of the Abipones*, II, pp. 70, 209, 217.

Patagonians: Narrative of the Surveying Voyage of H. M. SS. *Adventure and Beagle*, II, p. 162; R. Brown's *Races of Mankind*, Art. *Patagonians*, plate; Muster's *At Home among the Patagonians*, p. 77.

North American Indians: Catlin's *North American Indians*, I, pp. 238, 243; Schoolcraft's *History of the Condition and Prospects of the Indian Tribes of the United States*, II, p. 514; III, p. 486; Catlin mentions "lutes" twice in his book (I, pp. 38, 142).

Savages with lyres have pipes and drums:

Dyaks of Borneo: Marryat's *Borneo and the Indian Archipelago*, pp. 84, 133 (plate); St. John's *Life in the Forests of the Far East*, I, p. 118.

The Khonds of Khondistan: Campbell's *Narrative of Thirteen Years' Service among the Wild Tribes of Khondistan*, pp. 16, 164.

The Finns: Pinkerton, I, p. 473.

The Tartars: Mary Holderness's *Notes relating to the Manners and Customs of the Crim Tartars*; Clarke's *Travels in Russia, Tartary, and Turkey*, p. 316; *New Edinburgh Review*, 1822, p. 518.

The Cossacks: Atkinson's *Travels on the Upper and Lower Amoor*, p. 167.

The Turcomans: Chodzko's *Popular Poetry of Persia*, pp. 62, 419.

The Hindus: *New Edinburgh Review*, 1822, p. 525.

In continuation of his theory, Rowbotham adds instances of the dropping out of earlier forms of musical instruments, where the more primitive, instead of being used in conjunction with those of the higher order, were superseded by them.

Drums were in use in Lapland until 1600, yet in 1732 they are reported as having entirely died out.¹

He says the same is true of the Bushmen in South Africa, that they used the drum in 1800,² but now have only pipes and horns.³

The Muras on the Amazon have only horns, but they are Tupis, and Tupis have drums.⁴

In Iceland the drum and pipe dropped out about three hundred years ago, and there is nothing now in use but the lyre.⁵

¹ Scheffer's *History of Lapland*, p. 58; Linnaeus' *Tour in Lapland*.

² Burchell's *Travels in the Interior of South Africa*, II, p. 87.

³ Chapman's *Travels into the Interior of South Africa*, I.

⁴ Bates's *Amazons*, II, p. 10; *Ibid.*, Caishámas, p. 376.

⁵ Von Troil's *Letters on Iceland*, in Pinkerton, I, p. 652.

He says in his appendix (A), page 185:

I had prepared a catalogue of the African tribes with which we are acquainted, to discover whether the absence of stringed instruments prevailed in the center, the north, or in what direction it might be, of the continent. * * * But this tabulation I was obliged to discard, owing to the conflicting accounts of travelers; and, without endeavoring to trace the topography of the instruments, let us be content with the broad assertion that most of the tribes of Africa are in the lyre stage, and some are prematurely in it; that is to say, they are unacquainted with the use of pipes, which, in all strictness, should have preceded the knowledge of strings.

And he acknowledges his perplexity:

We have found that the lyre belongs to a very high stage of human development. We have found it in the hands of barbarians who were just emerging into civilization; yet in Africa we find it known to the most degraded savages.

This statement by Rowbotham throws doubt upon the correctness of his assumed order of development.

The collections of musical instruments in the United States National Museum and in the Royal Conservatory of Music in Brussels seem to verify his statement of the prevalence of the lyre among certain tribes of Africa where the pipe, or pipe and drum, are absent.

All this goes to show the difference between theory and fact, and is complimentary to Mr. Rowbotham in recognizing it.

Wallaschek wrote¹ after Rowbotham, and assailed strongly his theory of threefold development of aboriginal musical instruments. He denied the drum to have been the earliest or first invented, and asserted that which is demonstrated in this paper, that wind instruments (whistles, flageolets, and horns) were first invented and antedated drums. He reversed Rowbotham's order of simplicity and argued that the lyre or harp of Africa, formed as it might have been from a bent twig or the two branches of a tree with a string stretched taut between the ends, was not only more primitive and easier and quicker made, but, as confessed by Rowbotham in his appendix, it was in fact invented and in use among the most degraded savages of the country; that it spread over a large portion of the continent of Africa before the pipe or drum, and that it was in use among many other tribes in connection with pipes, but without drums. He cites the fact that the shepherd boy can with ease and in a short time, while tending his flocks, make, with the aid only of his pocketknife, a willow whistle, which is not difficult to be transformed into a flageolet of considerable musical scale; while all drums, so far as known, among primitive peoples, whether prehistoric, as shown in this paper, or modern, as among primitive or savage peoples, are machines or instruments of considerable complexity, requiring labor and thought, with much preparation, in order to perfect them. The log must be hollowed and wrought out, and is usually decorated in a more or less elaborate manner (fig. 233). The skin drum requires the preparation of the hoop and then of the skin, both of which require

¹ Primitive Music: Its Origin and Development, with Songs, Instruments, and Pantomimes of Savage Races.

considerable thought and time and can never be made impromptu or for an emergency.

Wallaschek declares that, both for simplicity and ease of manufacture, the pipe and lyre are in advance of the drum, and that the discoveries in antiquity and investigations in ethnography show them to have come earliest into use among both prehistoric and primitive peoples, and adds:

I can find nothing but speculative reasons and common consent for the drum being regarded as the most ancient instrument.

He continues (p. 37) his investigations among the various tribes and nations of primitive and savage peoples to demonstrate the error of Rowbotham's proposition and to show that the use of the pipe and lyre—that is to say, of wind and stringed instruments, without the drum—is quite as frequent and prevalent as is the contrary.

The authors are aware of the mass of literature on the science and practice of music, how historians and discoverers of primitive or savage peoples have reported, in many volumes, the music they have heard and the instruments with which it was made. These have not been followed nor any of their theories adopted. The sociologic or scientific sides of music among primitive or ancient peoples have been avoided. The authors have contented themselves with a description of prehistoric instruments and of such notes or tones as could be produced by their manipulation.

It was reserved for the white race to develop in times of antiquity the true art of music as it is understood at the present time, but the different nations composing this race have varied much in their notions as to the solution of the problem.

The Egyptians made music which, judging by the representations left of their musical performances and instruments, had considerable extent and variety. The exact nature of it can only be made out by ingenious inferences, and historians are at issue about their significance. It seems clear, however, that they acknowledged the octave, and that it was largely subdivided.

The music of the Chaldeans, Babylonians, and Phenicians may be assumed to have been of a similar character, the octave being also traced among them. Assyrian bas-reliefs on monuments dating from 1000 B. C. represent musical instruments which must have been older, and possibly many centuries older, than the monuments on which they appear. Carl Engel¹ shows the intervals of the *huayra-puhara*² of the ancient Peruvians. Instruments of this kind, of reed or stone, have been found in ancient tombs. One in the British Museum has a double row of reed pipes, of which one is open below and the other closed.

The Hebrews attached great importance to their music, but there appears no means of getting any definite information as to its tonality.

¹ Music of Most Ancient Nations, p. 7; *Ibid.*, pp. 13, 15, No. 7, Music.

² See fig. 325.

The music of the Arabs seems to involve extraordinary complications, and has furnished endless occupation for musical historians and theorists. The most interesting fact in regard to it is that the principal intervals of our scale, namely, the octave and fifth, were also the most important intervals with them. But the resemblance ended here, for their octave was divided into sixteen, or, according to some authors, into seventeen parts, and these not always equal, so that their music must have been very different from anything we are accustomed to. Sanscrit literature contains traces of a musical system in India some three thousand years old, which is still cultivated there. They have also the octavo division, which is subdivided theoretically into twenty-two parts. Their practical scale consists of seven degrees, among which the twenty-two theoretical intervals are unequally divided. The notes in the usable scale admit of many changes, forming distinct modes, and the system generally has many analogies with that of the Greeks. It is worthy of remark, however, that, judging by the frets on their principal stringed instruments, the subdivision of the octave by the fifth and fourth is acknowledged.

Another Aryan branch, the Persian, interests us because, so far as the early history of nations can be made out, their music seems to have been the remote ancestor of our own. The Aryans of Persia, like those of India, had originally a liking for minute intervals of sound, for they divided the octave into twenty-four parts.

It is through the known migrations of these races westward, and particularly into Greece, that their connection with our music is genealogically established. It is believed that, under the name Pelasgians, they settled in Asia Minor and in Greece some two thousand years before the Christian era, and their descendants or relatives, Lydians and Phrygians, afterwards mixed with other colonists, such as the Dorians, Æolians, Ionians, and Etruscans, who exercised considerable influence on their manners and customs.

The early history of Greek music is enveloped in obscurity. The Greeks had a most elaborate system of meter and rhythm, but it belonged chiefly to their poetry. The principal way in which they applied the idea of time to music was by making the duration of the sounds of unequal lengths correspond to the measures in their poetry, so that in singing, the long syllables should be sung to long notes and the short syllables to shorter notes. This was natural, but there is evidence that the idea was carried further, as signs for unequal length of notes existed in music unaccompanied by poetry, thus coming a little nearer to our modern notation. The earliest indications of a regular system of music are found in the little that is said of the poet musician Olympus, a Pelasgian by origin. He is believed to have lived during the twelfth century B. C., and is of some importance in history, as certain Greek authors and modern philologists ascribe to him the introduction into Grecian music of the so-called Enharmonic system. Others

ascribe it to the younger Olympus five hundred years later. A bas-relief in the Albani Villa at Rome shows Pan teaching Olympus to play the syrinx. It is represented in Baumann's *History of Music*.¹

A great change is supposed to have been brought about among the Pelasgians by the entrance of the foreign colonists before mentioned. The influence of these people, more heroic and energetic, was to do away with the delicate estimation of sounds and to bring about arrangements in which the intervals were larger. Hence came into vogue certain musical forms which took the names of the people to whom they were due, and three of these, namely, the Dorian, Phrygian, and Lydian, took at a later date a permanent place in the Greek system, and gave corresponding varieties of character to the music, the influence of which has been perpetuated to our own day.

About a century after Terpander came Pythagoras, whose genius as a philosopher enabled him not only to effect great improvements in the capabilities of music, but to establish for the art a definite and scientific basis intelligible for all time. He was, indeed, the founder of theoretical music, for it was he who first traced the laws which govern the relations of sounds to each other, and by this means brought music within the domain of natural philosophy. He established the principle that intervals could be appreciated intellectually by the aid of numbers instead of as formerly, by the ear alone. "Sense," he said, "is an uncertain guide; numbers can not fail." Pythagoras effected this by means of the stretched strings used for the lyre. He had acuteness enough to perceive the fundamental fact that the length of the string might be made to supply an exact definition of the pitch of the note it sounded. Hence he was enabled to attach to each sound a certain numerical value, and thus to compare it with other sounds and to establish positive and definite relations between them. The instrument which Pythagoras used in these investigations was called a canon, and appears to have been similar to our monochord.

The importance of this step, connecting for the first time music and mathematics, can hardly be overrated, and as the method Pythagoras introduced has become verified and established in use by all subsequent experience and investigation, he is fairly entitled to be called the "father of musical science." Out of his investigations the Diatonic scale grew into being. Euclid (B. C. 300), about two hundred and fifty years after Pythagoras, describes the formula and gives the proportionate length of string corresponding to the various notes of the scale, a mode of determination quite conclusive.

Other elements have been added, but the Diatonic scale has remained essentially unchanged. As the series of notes was when Euclid described it, so it is now, and as it formed the basis of Greek melodies two thousand years ago, so it forms the basis of the music of the present day.

¹ Volume I, fig. 87, p. 126.

EUROPE.

PALEOLITHIC AGE.

Lartet and Christy found prehistoric whistles in the cavern of Laugerie Basse, in the Dordogne District, France. They also found whistles of the same kind in the cavern of Aurignac. It was supposed that both these caverns belonged to the Paleolithic period, and, therefore, they afforded corroborating evidence of the use of these instruments in that period. Later investigations rendered this certain with regard to Laugerie Basse, but made it uncertain with regard to Aurignac. When the first whistle was found, in 1860, in Aurignac it was reserved by these gentlemen for this confirmation, but afterwards, when, as they say, there had been many discoveries of this kind of instrument, notably



Fig. 166.

BONE WHISTLE, PHALANX OF REINDEER, PALEOLITHIC PERIOD.

Cavern of Laugerie Basse, France.

Natural size.

those from the Laugerie Basse, so that specimens are not now rare in museums and collections, they felt themselves justified in assuming the existence and use of this instrument in Paleolithic times. Fig. 166 represents the whistle from Laugerie Basse, taken from Lartet and Christy's "*Reliquiæ Aquitanicæ*," and is plate V, fig. 21. It is described as the first digital phalanx of the hind foot of a reindeer. A hole has been bored in its lower surface near the expanded upper articulation. On application of the lips to the hollow of this articulation, and blowing obliquely into the hole, they got a sharp sound analogous to that produced by a cat call or a key used as a whistle.

Marquis de Nadaillac¹ figures a whistle of deer horn or reindeer phalanx from the collection Massenat (Brives, France) similar to that shown in fig. 166, and states that others have been found in the caverns of Les Eyzies, Schussenried, and Chaffaud. He continues that they have been found in the Belgian caverns, in the peat beds of Scania, southern Sweden, in the island of Palmaria, and at other points. He says that there have been found, in the Grotto of Cottés, the radii (canon) of the reindeer and auroch treated in the same manner, and which might have been destined for the same purpose. He tells of Longperier's mention of a human bone pierced with holes at regular intervals, serving, by a strange irony of death, as a flute with which to charm the living; also of Judge Piette, who, in one of his numerous excavations, discovered a flute made of two bird bones which, joined, would make modulated tones. Similar bones were found in the collection at Rochebertier. Beyond these he knows of none. The whistles, he thinks, may have been used in war or in the chase, but he expresses

¹Moeurs et Monuments des Peuples Préhistoriques, pp. 92, 93, No. 30.

no opinion as to the probable use of the flutes. The chief value of his report is in finding the instruments. This done, with their respective strata and associations, they speak for themselves, and the inspector or examiner is as well qualified to determine their function as is their finder. His qualification is to be determined by his experience with other or similar finds, and his ability to compare them with other instruments. It is to be remarked that, while the first series mentioned above by Marquis de Nadaillac are from caverns mostly or possibly Paleolithic, the remainder are probably Neolithic, though this would require closer examination and greater knowledge of the locality and strata of their origin than is now possessed by the author.

Furfooz is one of a number of prehistoric stations, many of which are Paleolithic, near Namur and Dinant, on the head waters of the River Meuse. They are justly celebrated by the excavations made therein by M. E. Dupont, the finds from which form a large proportion of the interesting display in the National Museum at Brussels. The greater number of these stations were caverns or shelters used by Paleolithic man. The superimposed strata in these caverns indicate with great certainty and satisfaction the chronological as well as the cultural sequence of their occupation by man. In one of these caverns, and in a stratum believed to have been formed during the occupation by Paleolithic man, was found the celebrated pottery vase, in fragments, which has been restored and is displayed in the Brussels Museum, and which has figured so extensively in the determination by prehistoric anthropologists that, while man did not make or use pottery during the Paleolithic period in France, he did in Belgium. In this station at Furfooz has been found, in what stratum I am not able to say, nor even do I know positively in which cavern, but quoted from the *Annals of the Société Archæologique de Namur*¹ as having been found "*dans les bains voisins de la forteresse*," a whistle of white clay, (*en terre blanche*) (fig. 167), in the form of a bird, the mouthpiece of which was in the tail and the venthole in the belly, as seen in the figure. Another whistle, said to have been found in the phosphate beds at Mesvin near Mons, Belgium, and claimed to have been paleolithic, is in the possession of M. Leon Somzée of Brussels.

The question will immediately arise whether these were really musical instruments. It has been suggested that they were for calls or signals and may have been used, as the boatswain does his whistle, to direct the movements of men at a distance. This would not be music, and if they were always thus used they would not be musical instruments; but if, on the other hand, they were used to give a rhythmical cadence



Fig. 167.

TERRA-COTTA WHISTLE, BIRD-SHAPED. BRONZE AGE.

Near cavern of Furfooz, southern Belgium.

¹ Volume XIX, 1892, p. 360.

to a dance or song, or for any similar purpose, they would be musical instruments. Any attempt to decide to which use these objects were put and so decide whether they were or were not musical instruments would be mere speculation. That they might have been used as such, and that hundreds of other similar instruments have been found which were used as musical instruments, justifies this classification and their insertion in this paper.

The Grotto or Cavern of Gourdan, in Haute Garonne, France, was explored by Judge E. Piette. The work of exploration lasted for three years (1871-1874), and was conducted by a Frenchman whom I met there who served as cook at Delmonico's for four years (1861-1864), and who, having thus made his fortune, returned to Gourdan and established himself as innkeeper. He did the work of excavation under pay from Judge Piette, and it occupied him for three years. This was another of the caverns in which the superimposed strata evidenced the chronological and cultural sequence between the Paleolithic and Neolithic occupations. In a stratum of the later period, amid much charcoal and cinders, he found a bone flute or pipe pierced with holes and capable of producing three notes.

A memoir appeared in the report of the Société Académique des Sciences, etc., of St. Quentin, France, for the year 1873-74, XII, 3d ser., p. 339, written M. Textor de Ravisi, wherein he argued as to the existence of musical instruments in the age of stone, and, maintaining the affirmative, he cites the invention of M. Baudre, who had made what he called a "Clavier de silex," that is to say, a sort of piano or xenophone, composed of twenty-eight stones, twenty-six of flint and two of schist. They were arranged according to note and sound, whether made so by size or shape is immaterial, and were struck with a pebble, producing the melody. The inventor chose natural pieces of flint, and did not chip them to size or form. He insisted that the natural pieces produced infinitely better tones than those which were chipped. While this instrument was entirely possible in Paleolithic times, yet there is nothing to show that it was ever invented or used. Indeed, there is nothing in all the discoveries that have ever been made to show that Paleolithic man had any system of music applicable to this instrument, or that he would have recognized it or the music if either had been presented before him. There is an instrument similar to this in the Museum of Science and Art at Dublin, but the stones are all of schist and none of flint. These are no evidence of prehistoric musical instruments, and are only ingenious modern inventions by which our present scales of music are brought into use.

NEOLITHIC AND BRONZE AGES.

M. Fétis¹ gives an illustration of a pipe from a prehistoric grave of the Neolithic period near Poitiers, and of which a cast was fur-

¹ Histoire Generale de la Musique.

nished him by M. Lartet. It was rudely constructed from a stag horn, was blown at the end like a flageolet, and had three finger holes equidistant.

SCANDINAVIA.

Luhrs.—The most elaborate, as well as the most beautiful instruments of music belonging to prehistoric times, were the bronze and gold trumpets or horns of Scandinavia. They are not toys, but are of large size, quite as large as any horns of modern times, being sometimes 5 and even up to 8 feet in length, with bell mouths 6, 8, and 10 inches in diameter. No particular style was adopted, though all specimens agree in the requisites of the horn or trumpet. Some are straight and some curved, after the fashion of the modern horn; others, again, are curved at one, and still others at both ends. The majority of these instruments are of bronze, cast in short sections with joints or shoulders, which, being fitted, are riveted together. The straighter ones are in longer sections and, consequently, with fewer shoulders, while those more curved have proportionately shorter sections and more shoulders. The variations of form and consequent changes in manufacture will be apparent on inspection of the figures.

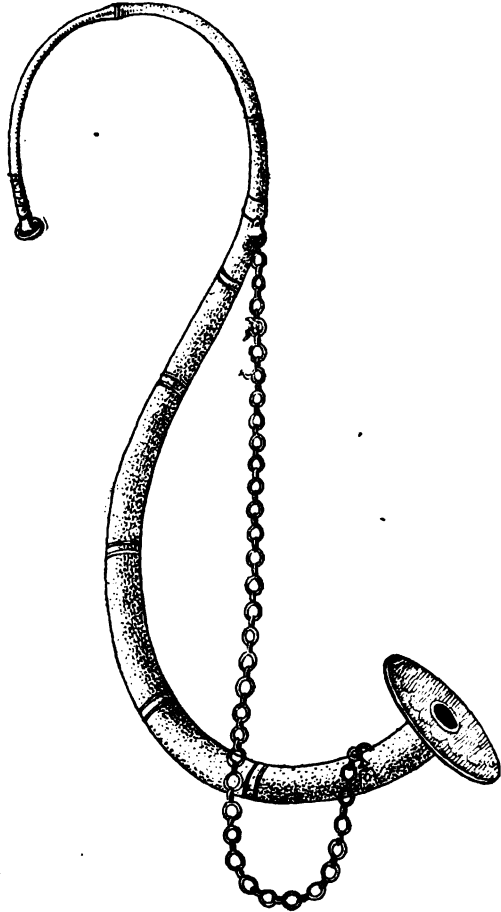


Fig. 168.

BRONZE HORN, MOLDED.

Length, 8 feet.

Maltbeck, Denmark.

One of twenty-three in Copenhagen Museum.

These horns are called *luhrs* by the Danes. They are from southern Sweden and Denmark as far south as Sleswick, but not farther. They are found mostly in peat bogs. Whether this was an intentional deposit and for the purpose of their preservation has never been determined.

Fig. 168 represents one of these large horns curved at both ends, in

the shape of the letter S, found at Maltbeck. It is nearly 8 feet in length, measuring the convex sides. It had been cast in sections, which have been fitted and riveted. It has a disk upon the larger end (similar to fig. 187 from Ireland), the decoration on which is a representation of the daisy flower. The small end was provided with its mouthpiece, which is rather uncommon, and, as will be seen shortly, it was capable of being played upon. The details of this instrument, mouthpiece, disk at bell mouth, chain, ring, and strap, are shown in accompanying figs. 169 *a, b, c, d*. This specimen is reported in the guidebooks

of the Museum of Antiquities at Copenhagen as belonging to the fourth hall or room containing objects of the Bronze age, as No. 74, with the following label:

Twenty-three (23) trumpets of war (luhrs) composed of sundry pieces of bronze molded separately; found in the peat bogs, ordinarily in pairs.

This instrument has attracted the attention, both of the archaeological and musical world, and sundry reproductions of it have been made—one is in the British museum, one in the Museum of Natural History, New York city, and one in the Musée Instrumental of the Royal Conservatory at Brussels (see No. 1156 of its catalogue), the latter giving the scale, from E-flat in the bass clef to E-flat on the upper space in the treble clef.

A notice of a concert by the instruments in the Copenhagen Museum was published in the Washington Evening Star, February 6, 1896, from the San Francisco Chronicle, which is here inserted:

An enormous crowd fills the museum and neighboring square at Copenhagen every midsummer day to listen to a unique concert. A number of ancient Scandinavian horns more than three thousand years old, called "luhrs," are kept in the museum. Of this collection fourteen are in good condition. They have an elegant shape, and the flat metal plates at the mouthpiece show good technical perfection and a developed taste for art. They are in different pieces fitted together. They are of very thin metal, and generally 7 feet long. A few years ago it was found out by Dr. Hammerich that they could still be blown or played upon. Their tones resemble those of the tenor horn, and they have a soft but powerful sound. Some are tuned in C and E sharp and others in D, E, or G, and these tones form an accord, but no

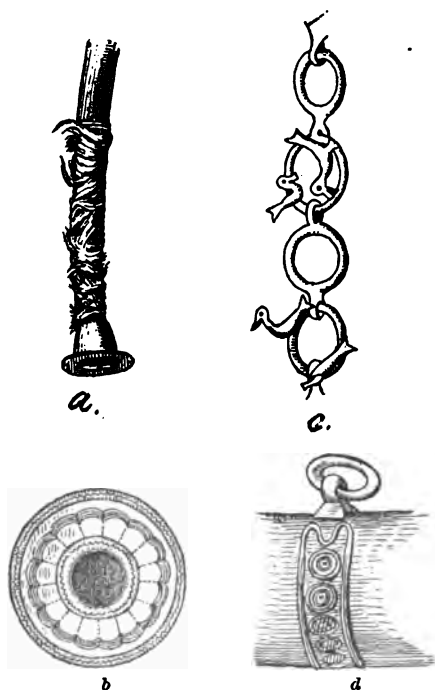


Fig. 169.

DETAILS OF FIG. 168.

(a) mouthpiece; (b) disk at bell mouth; (c) chain for suspension; (d) strap and swivel for chain.

"scala." On the balcony in the court of the palace in which is kept the Northern Museum two members of the "capella" blow tunes on two of these primeval horns to the delight of the inhabitants.

Professor Starr says of one of these concerts:

We had the good fortune to be present. The court of the museum was filled with hearers. Wonderful, is it not, that horns two thousand years old, buried for long centuries in peat bogs, should, after this long silence, still be capable of giving out clear, ringing, even sweet, tones.¹

The age of bronze is supposed to have begun in Scandinavia about 1500 B. C. It has been divided, for convenience of description, into the first and second periods, corresponding in some degree with the same ages in continental Europe, especially France, to which M. de Mortillet has given the names (1) Morgien and (2) Halstattien. These subdivisions have been made principally from the inspection of the objects themselves, their development, and their associations. It is believed by those who have studied the subject with the greatest attention and the most in detail that whencesoever the bronze may have come and howsoever the knowledge to work it came, that most of the objects found in Scandinavia were made in the country; consequently, are of a culture and art indigenous thereto, and that this applies to both periods. Nearly all bronze objects were made by casting. It is not until near the close of the age of bronze that evidences of hammering as a method of manufacture have been found. Hammering and drilling were employed after the object had been cast, and for the purpose of putting it together. Many molds in which objects were cast have been found throughout the country, but, so far as known to the author, none which were used for casting these trumpets or horns. A moment's consideration will make apparent the difficulty in casting. Their length, the size of the piece, the thinness of wall, the extent of core, together with the exactness required to make the sonorous quality, not only so that they shall sound, but that they shall make a note within a given scale—a consideration of these difficulties, and the ability displayed by their makers in overcoming them, should increase largely our appreciation of the capacity of the workmen. One of the most beautiful specimens of bronze vases of elegant form and choice decoration was found in the Island of Funen with the core of clay still in it, thus enabling its discoverers to determine with certainty the method of its manufacture. The casting had failed in part and was never completed. The many other similar vases which were successfully made is proof of the capability of the workman. No evidences of the art of soldering during the bronze age have been found in Scandinavia. Not only have no soldered specimens been found, but many objects were repaired without solder. Two methods were employed, riveting, or by the apparently more difficult process, described elsewhere, of pouring molten metal on the junction of the broken pieces.

¹ Popular Science Monthly, LXVII, p. 22, May, 1895.

until they themselves have become melted and the new and old were fused and formed a solid mass.

Thus much for the Bronze age; but this does not account for all the prehistoric objects in bronze belonging to that country. The prehistoric ages of iron have been divided into three epochs, covering a period from some time anterior to the Christian era until about 1000 A. D., when the historic period as represented in the known languages of Europe began. The languages used in Scandinavia prior to this time were Runic. They were protohistoric but afterwards passed out of use. The term "iron age," while it denotes the use of iron, was principally applied to its use for cutting implements. Bronze did not cease to be used for many purposes, and among the rest, for the luhrs or trumpets or horns. Therefore many of these instruments of bronze have been found which belonged to the prehistoric ages of iron. The question of chronology can only be determined by critical examinations of almost infinitesimal details in the manufacture, form, kind, and use of implements, and of the objects associated with them, and even then errors are not infrequent. This should be borne in mind in criticising the assignment of any given instrument to a certain age or period.

In the last age of iron, when the runes had passed their final stage of improvement and are capable of being read, we gain much information therefrom concerning the life history of the people, and find they made war, indulged in the chase, and played games, as other people did then and have ever done. A social custom which prevailed among the Scandinavians, peculiar to them and to the Celts, and possibly other peoples, was that of minstrelsy, whereby the instruments of music were brought into use. Mr. Montelius¹ says:

Of musical instruments, we read of the lyre, the horn, the pipe, the fiddle, and above all the harp, one of the oldest and most prized. Snorri relates of Olaf Skötkonung, that when the meats were set upon the king's table, the players stepped forth with "harps, fiddles, and other instruments." To the tones of the harp the skalds generally sang their songs. Skalds often visited at the court of the Swedish kings; sometimes they came from Iceland.

Of these, the horn only seems to have been prehistoric, and it alone has received attention in this paper.

In 1801 eight of these large curved bronze horns were found in a peat bog or turf bed, Brudevalte, in a field near Liunge in the neighborhood of Fredericksborg. These were intact and complete, mouth-piece and all, are in the museum at Copenhagen, and have lately been played upon, as previously related. The longest was 6 feet and some inches, while the largest disk on the bell mouth was 11 inches in diameter.

Fragments of bronze horns had before been found throughout that

¹La Suede Prehistorique, p. 145; and Civilization of Sweden in Prehistoric Times, p. 177.

country and gave rise to much speculation as to their possible origin and use. The discovery of these complete horns identified the objects and solved the doubts.

Another bronze horn in the museum of Copenhagen, 5 feet in length, was discovered in a peat bog at Wedellsborg, Island of Funen, in the year 1809. It had a chain attached.

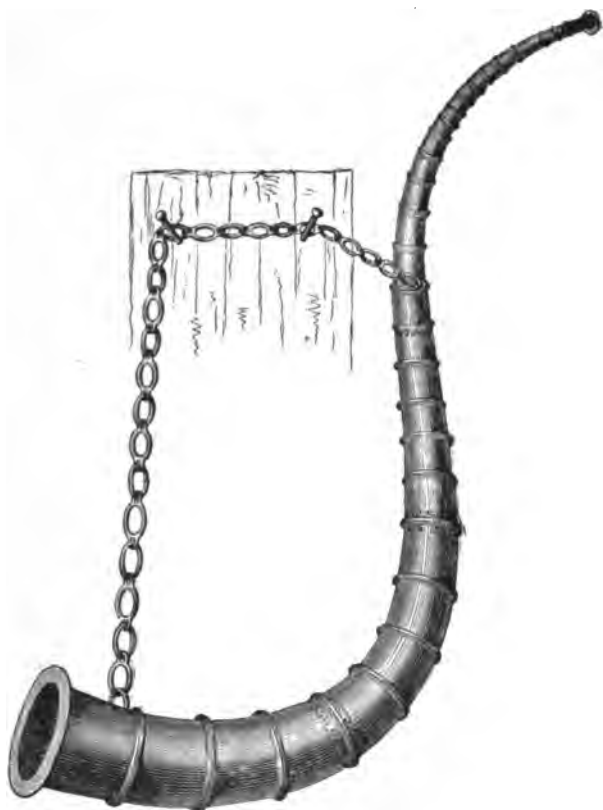


Fig. 170.

BRONZE HORN. SECOND AGE OF BRONZE.

Length, 3 feet 4 inches.

In Archaeologic Museum of Lund, Scania, Sweden.

Fragments of a bronze horn have been found in a bog near Lumme-löv, Island of Falster. There are now twenty-three bronze horns in the museum in Copenhagen.

Fig. 170 represents a war (?) trumpet of bronze, cast in sections, fitted and riveted as before described. It is said to belong to the second age of bronze. It was found 8 feet beneath the surface in a peat bog near the city of Lund, Scania, Sweden, and is in the Archaeological Museum of the university of that city (No. 4372). Its length is 40 inches. It was in perfect order and is yet capable of giving its

proper sound. The figure is taken from *Antiquities Suedoises*¹ by Montelius.

Fig. 171 represents a horn belonging to the Iron age (prehistoric), found in a peat bog in Södermanland, Sweden. The middle portion is an ox horn of which only enough remains to show what material it was.

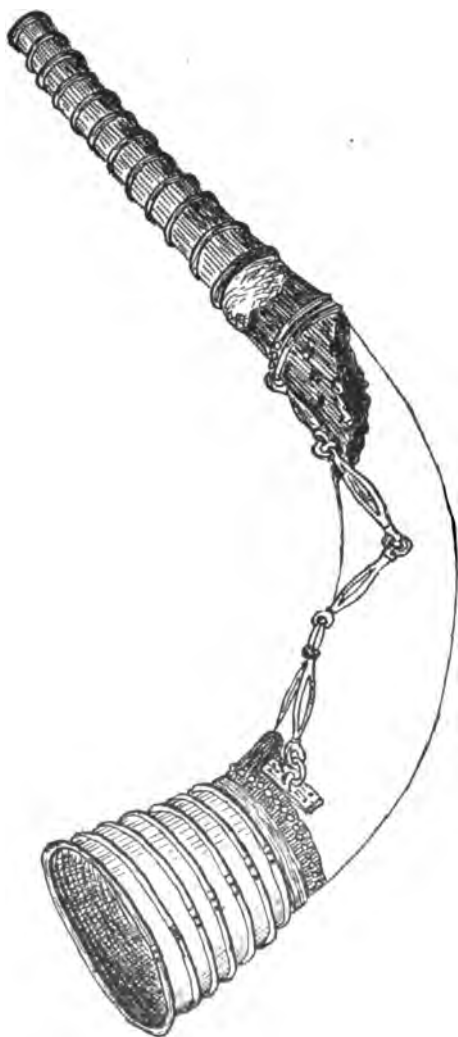


Fig. 171.
OX HORN WITH BRONZE MOUNTINGS, FOR MUSIC OR DRINKING, OR BOTH.
Södermanland, Sweden.
A natural size.

The mountings are elaborate and are attached at either end in such way as to lengthen the horn and increase its power as a musical instrument. The two mountings are attached by a bronze chain with long links, which has served for suspension or carrying. It is taken from Montelius.² The small ends of many of these horns were destroyed when found, and so it is undeterminable whether they were used for music or for drinking. Horns similar in all appearance to these were in that country and in that epoch used for both purposes.

Fig. 172 represents a horn, probably of the Iron age, with bronze mountings. It may have served for music or for drinking. It was arranged with a long linked chain. It, with two others, was found in a burial tumulus at Sojvide in Gotland, in a

stone cist, with about five hundred bronze beads, two pottery vases, belonging to a single skeleton. The specimens are in the National Museum in Stockholm, Sweden.

Fig. 173 represents a bronze war trumpet taken from Worsaae.³ It is

¹ Volume I, p. 53, fig. 178. ² *Ancient Swedish Civilization*, p. 107, fig. 115.

³ *La Colonisation de la Russie et de Nord Scandinave*, p. 72.

without description as to size, time, or place of finding, or present deposit. It is given because of a different form from any heretofore shown.

Gold horns.—The chefs-d'œuvre of prehistoric horns were the magnificent ones found, respectively, in 1639 and 1734, in the little village of

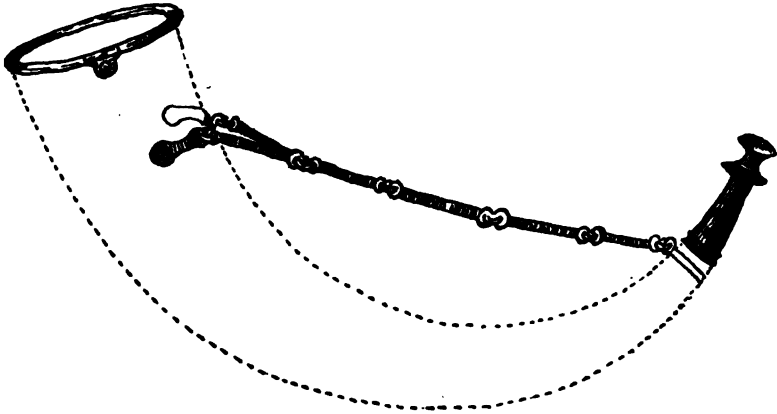


Fig. 172.

OX HORN WITH BRONZE MOUNTINGS, FOR EITHER MUSIC OR DRINKING.
Gotland, Sweden.

Montelius, *Antiquitet Suedolmer*, II, p. 114, fig. 381a. $\frac{1}{2}$ natural size.

Gallehuus, on the western coast and in the Duchy of Sleswick, near the boundary between Denmark and Germany. These instruments are, or were, so beautiful and valuable, and their history so well authenticated, as to justify their description.

On July 20, 1639, a young girl of poor family named Kristine Svendatter (daughter of Svenon) left her house to go to the little village of Tonder. Walking in her bare feet, she stubbed her toe against what she thought to be a root. She struck it a blow with

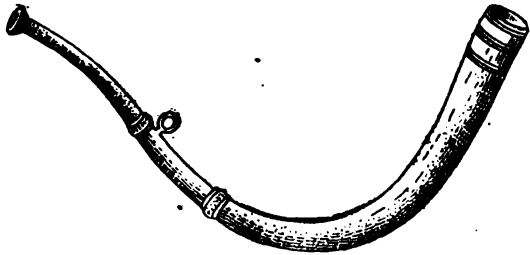


Fig. 173.

BRONZE HORN FROM SCANDINAVIA.
Worsaae.

her staff, gave an imprecation upon it, and passed on. Some days afterwards fate or luck caused her to pass the same way, and she struck her toe against the same object, which excited her indignation if not her wrath, and she determined to cut down or dig up the root which lay in the path of travelers and which on these two occasions had served her such a trick. She dug it out and found it to be this horn (fig. 174). Certain neighbors gave her their opinion that it was a huntsman's old tin

horn and not worth carrying home; but she decided to the contrary and carried it with her, with no idea of what it really was. Arrived at home, she washed it and concluded it to be of tin or copper, still of no value. There were certain rings upon it which she gave the children to play with. After some days she went to the market town and took with

her one of these rings to be examined, when it was discovered that the ring was not only gold, but unusually fine gold. The King of Denmark, Christian IV, was then at Gluckstadt with his son, Prince Christian. The golden horn was brought to him, he made recompense to the girl, and presented the horn to his son, the prince. He had at first the idea to have the piece melted and made into a new-fashioned cup, but better counsels prevailed, and a goldsmith was employed to clean and put it in good shape, which he did. It had neither cork nor mouthpiece, so no one was able to say whether it had been used as a music or a drinking horn. The gold worker settled the question for the moment by preparing a cork with gold trimmings, and the horn was ever afterwards used as a drinking cup on state occasions. Its capacity was 5 pints.

About one hundred years thereafter, April 21, 1734, a poor peasant named Lassen, or Laritzen, of the same village of Gallehuus, was digging for clay in the field about 25 paces from his cabin, when his pick struck an object which shone with great splendor. On digging it out it was found to be the gold horn indicated (fig. 175). Almost



Fig. 174.

GOLDEN HORN, MOLDED IN HANDS, SOLDERED AND CRIMPED.
Length, 34 inches; weight, 6 pounds 6½ ounces. Found in 1639 at Gallehuus, Denmark.

a hundred years had passed since Kristine Svendsatter had stubbed her toe against the first one and, naturally, there was difficulty in identifying the exact spot, but according to tradition, the second was found 3½ paces to the southwest of the first. The horn was cared for by a goldsmith in Tonder, determined to be fine gold, and then placed in the possession of Count Otto Diderick Schack, proprietor of the domain. It

was transmitted to King Christian VI, who gave to the peasant 200 rigsdalers.

Description of the horn found in 1639 (fig. 174): Its length was 34 inches; at the bell mouth its circumference was $12\frac{1}{2}$ inches, and the diameter $4\frac{1}{4}$ inches; at the small end, which, however, had no mouth-piece, its circumference was $4\frac{1}{2}$ inches, and its diameter $1\frac{1}{2}$ inches. Its weight was 6 pounds $6\frac{1}{2}$ ounces. Its manufacture was complicated, somewhat difficult to describe in detail, and, perhaps, unimportant from the view point of a musical instrument. It was made of thick sheet gold; whether hammered or cast does not appear. It was double throughout, one sheet forming the interior, which was solid, smooth, and polished; whether made in a single sheet or by a succession of sheets soldered together is not now known. The interior sheet of gold was less pure than the exterior. The exterior plate was made in bands or sections, as shown by fig. 176, thirteen regular ones and a small one at the bell mouth. These bands graduated in size and length from the large to the small end of the horn. The six smallest bands were



Fig. 175.

GOLDEN HORN, FRAGMENT.

Weight, 7 pounds $5\frac{1}{2}$ ounces. Found 1734 at Gallehuus, Denmark.

soldered to the interior sheet so as to form a solid piece. The other seven bands were different. While the bands at the smaller end may have been made separate and afterwards soldered together, the junction being covered by the solid ring, as shown in the figure, it is certain that the seven larger bands were made separate, for they were not soldered together, but inserted one into the other continuously after the fashion of a stovepipe, the junction being crimped so as to prevent their separation, yet permitting them to be rotated one upon the other. These junctions were then covered by separate gold rings, as shown in the figure, each ring fitting to its particular place. These seven larger bands were covered with figures, some of which were cast and soldered on, while others were made by punch marks (*pointillé*). The character and different kinds of these designs are not to be described, yet will be apparent on inspection of fig. 176, showing details.

Description of horn found in 1734 (fig. 175): This horn was broken and probably half of it (that of the smaller end) was not found. It was heavier and larger than the first one (fig. 174). It was made in

a general method with a smooth interior surface and exterior all of which were soldered together. There were only five extensions in the fragment. The weight was, nevertheless, 7 pounds ½ ounces—15 ounces more than the first one, although that was complete.

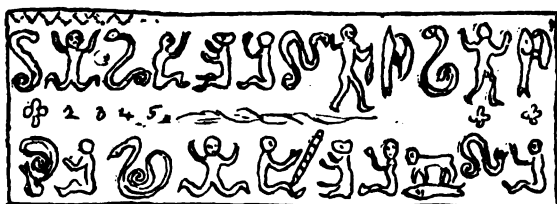


FIG. 176.

DETAILS OF FIRST GOLDEN HORN (fig. 174): SEVEN BANDS MOLDED AND CRIMPED, WITH SOME ORNAMENTS MOLDED AND SOLDERED ON, OTHERS PUNCHED.

The ornaments (fig. 177) were, like that of the first, some cast and soldered on, while others were made with punch marks—*pointillé*.

The designs upon the two horns, respectively, are from their form, manner of making, and mechanical work generally, evidence that they both belonged practically to the same epoch. The ornaments (fig. 177) upon the horn (fig. 175) (1734) were artistically inferior to the other. There have been, of course, many attempts on the part of antiquarians to decipher or translate these figures and discover the date of the making of the horns. These efforts have resulted in many theories, with none of which we are particularly interested. They were supposed to be calendars of antiquity, to represent the signs of the zodiac, to be a map of the heavens and so deal with astronomy, to

have related to the worship, first of the sun and then all within the range of Scandinavian mythology, as well as other mythologies. The antiquarians who made the most profound studies of these horns, and whose description and opinions are best entitled to consideration, were (1) Mr. E. P.

Muller¹ and (2) Kanut Henneberg.² The first gentleman concludes that both horns were the work of one and the same people, that none of the figures had any relation to Scandinavian mythology, but have a greater relationship with the Mongols, perhaps had been brought from Siberia,

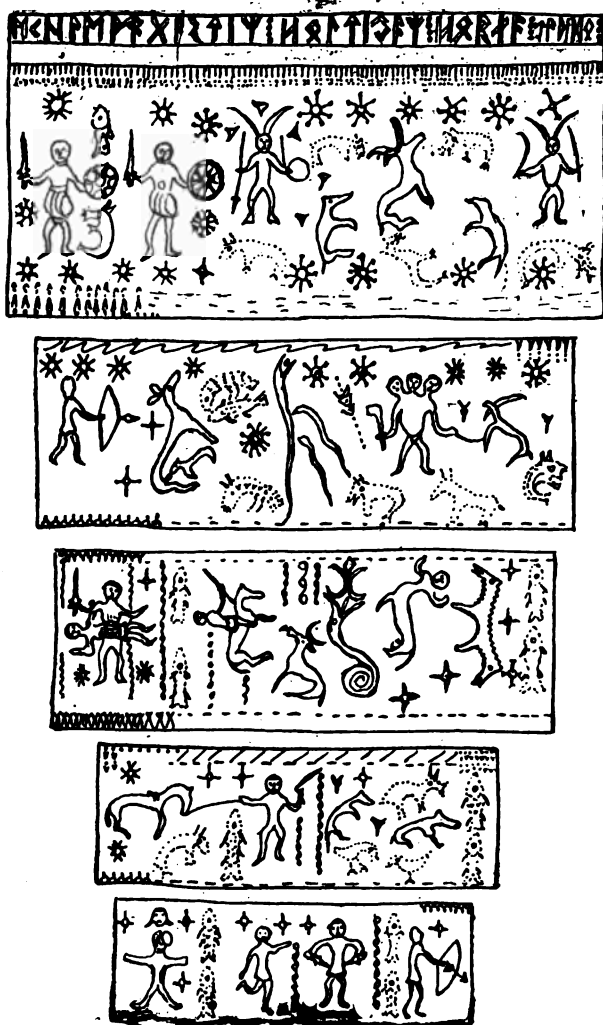


Fig. 77.

DETAILS OF SECOND GOLDEN HORN, FIVE BANDS (fig. 175).

¹ "Antiquarisk Undersøgelse over de ved Gallehuus fundne Guld-horn (an archaeological examination of the gold horns found near Gallehuus). Copenhagen, 1806 quarto, with designs of the two horns engraved by G. L. Lahde."

² "Hvad er Edda? eller Raisonneret kritisk Undersøgelse over de tvende ved Gallehuus fundne Guld-horn. (What is this but the Edda; or a critical examination and argument as to the two horns disinterred near Gallehuus.) Aalborg, 1812, quarto, with designs engraved by J. Flint."

and had probably served as ornaments in the temple of Jomale in Burmah, a suggestion derived from certain Sagas of Herraud and de Bose. He interprets the Runic inscription as Celt-Iberian, and perhaps Druidic.

The second gentleman attributes these golden horns to a different origin. He thinks he recognizes the gold of which they are made as from Hungary, Transylvania, or perhaps the Crimea. The figures upon them suggest to him the usage of the Vandals who combined the worship of Odin, Thor, and Friga, with that of their national gods. It is agreed by both these gentlemen that the figures denote a barbarous epoch so far in the past that, if they have any meaning at all, it is now inexplicable beyond theory or suggestion.

The last found horn (that of 1734), fig. 175, had a Runic inscription in the narrow band at its bell mouth. This inscription has been read, reread, and guessed at, until it has received every kind of rendition. The results of the principal attempts in this direction have been given in extenso by Mr. C. C. Rafn.¹

W. F. Kopf, 1821, writes: "I am (both) a horn of the chase (hunter's horn) and a drinking cup (dedicated) to the orgie (ceremony) of Holte."

According to Gisle Brynjulfsson, 1823: "I, Hlevus, have made these two horns," or "Thorfin and Leif have made both these horns."

Fin Magnussen, 1834, says: "I bring to the sacrifice the envelope of the horn of Tovid."

N. M. Petersen, 1837, gives: "I, Hlevo, have made the envelope of this horn."

According to Jacob H. Bredsdorff, 1838: "I, Hleva, have made these horns for my guests, the inhabitants of the forest (the Holsteinois)."

Jacob Grimm, 1848, writes: "Holsatis, intimis hospitibus pocula dedi."

K. Mullenhoff, 1852, says: "I have made these horns for the Holzigen, or guardians of the forest."

C. C. Rafn himself makes the following literal rendition:

ECHLEV OG OSTIR HULTINGOR
HURNO TVO VIGI U

which he translates into Danish as follows:

Echlev ak Astir (Eyleife ok Astyr) Hyltingar tva (two) vigpu, which in English is "The Holsteinois, Echlev and Astyr, have initiated (or consecrated) these two horns." According to his examination of history as set forth in certain of the Sagas, Mr. Rafn concludes that Eglaf or Eyleif was a chief of the southern Danes in Holstein about the fifth century.

Both golden horns were deposited in the Royal Cabinet of Curious Objects. A thief, by the aid of false keys, broke into the cabinet May

¹ Atlas of the Archæology of the North, published by the Royal Society, Copenhagen, 1860.

4, 1802, and stole both horns. To avoid detection, he melted them into bars, and, being a goldsmith, he fabricated therewith chains, collars, buckles, and other jewelry. This further excited his avarice, and he began the falsification or adulteration of the gold in his manufactured objects, which led to his detection and final conviction.

The foregoing descriptions were from measurements, drawings, and casts made while the horns were in existence.

IRELAND.

Bronze horns.—The ancient musical instruments of Ireland, so far brought to the notice of archaeologists, are the horn or trumpet, the harp, and the bagpipe. The two latter are more modern and are probably not prehistoric. The Museum of Science and Art at Dublin possesses several ancient harps, attractive on account of their historic and national interest, but they are not for us. The only prehistoric objects found suspected of belonging to this class are the bone hairpins (?) from the Strokestown Crannoge.

Fig. 178 shows a metacarpal bone of a deer. It is 8 inches long, is hollowed artificially throughout and perforated with nine holes, each of which is surrounded by a circular incised line, the upper hole with two



Fig. 178.

BONE FLAGEOLET (?), FRAGMENT, METACARPEL OF DEER.

Museum of Science and Art, Dublin.

lines. It is otherwise decorated with dots and lines. Sir William R. Wilde¹ was doubtful about this being a musical instrument. He says:

If it was the top member of a lute or a small rude harp, the holes might have been used for holding the pins to which the strings were fastened.

It is here figured as possibly a musical instrument.

M. Paul du Chailly wrote his interesting work, "The Viking Age,"² to demonstrate the proposition that the early settlers of Britain and the British Isles were Vikings rather than Anglo-Saxons. He based his theory upon the similarity of the many objects found, respectively, in Britain and Denmark. While his theory has not been accepted generally, yet it must be confessed that the similarity he points out was remarkable. Not the least is it so with regard to the trumpets or horns (luhrs). A fact in this similarity opposed to Du Chailly's theory is that the greater, almost the entire, number of these trumpets are found in Ireland, while they are extremely rare in England. Sir John Evans³ records that as early as 1713 Mr. F. Nevill described⁴ eight bronze trumpets found at Dunganon, County Tyrone, Ireland.

¹ Catalogue of Antiquities of the Royal Irish Academy, p. 344, fig. 225.

² Two volumes, pp. xix, 591, and viii, 562; fig. 1364.

³ Ancient Bronze Implements of Great Britain and Ireland, p. 358.

⁴ Phil. Trans., XXVIII, p. 270.

Sir W. R. Wilde¹ reports that the earliest historic notice of the discovery of these instruments was by Sir Thomas Molyneux in his "Discourse Concerning the Danish Mounds, Forts, and Towers of Ireland," 1725. This author bases his opinion upon the work of Olaus Wormius's treatise of the antiquities of Denmark (1655), in which everything of high antiquity found in Ireland was accredited to the Danes. This was carried to such excess as to include many things exclusively Irish, and of which nothing like them were ever found in Denmark. These authors were followed in some degree by Du Chaillu.

In 1750 thirteen or fourteen of these curved bronze horns were discovered near Cork. Three of them were figured by Charles Smith in his "History of the County of Cork," and are believed to be the same sold to Bishop Pocock and figured by the Society of Antiquaries in "Vestuta Monumenta," and afterwards copied in the "Historical Memoirs of the Irish Bards," 1786.

Three trumpets and a fragment of straight tube were discovered in the County of Limerick in 1787, and figured in Volume II of its Transactions. In 1794 four bronze trumpets were found in a bog on the borders of Loch Nashade, near Armagh. In 1809 two joints of a large and perfect curved bronze trumpet were found in a peat bog at Ardrin, County Down. In 1833 Dr. Petrie² described and figured a cast bronze horn, one of several found at Dowris and then in possession of the Dean of St. Patrick, one of which is here represented as fig. 181. In 1835 several trumpets were discovered in a bog near Killarney. The largest measured 15 inches and the smallest 10½ inches from point to point. They were distributed among various antiquarians in Cork. In 1847 three trumpets were discovered near Cloghoughter Castle, County Cavan. In 1840 four trumpets were discovered in the bog of Drumbest, County Antrim.

The Royal Irish Academy, recently consolidated with the Kensington Museum under the denomination of the Museum of Science and Art, Dublin, possesses sixteen specimens of these bronze trumpets. Sir W. R. Wilde³ divides them into two classes—(1) those of which the small end is stopped and the mouth hole is in the side, flute fashion, and (2) those with the small end open and the mouthpiece inserted trumpet or horn fashion. On none of the specimens was any mouthpiece found, but the appearance when found and subsequent examination satisfies the student of its existence and use. Of those blown from the ends, some were cast and some hammered and riveted. Those closed at the end and with mouth hole on the side were all cast. From these differences he makes five varieties of prehistoric bronze trumpets in Ireland.

The cast specimens were in one piece, having been molded com-

¹ Catalogue of Antiquities of the Royal Irish Academy, I, p. 623.

² Dublin Penny Journal, II.

³ Catalogue of Antiquities of the Royal Irish Academy, I, pp. 626, 627.

plete in a single operation, the work of cleaning, drilling, and decorating having, as in modern times, been done subsequently.

The other specimens were of thin sheet bronze, originally cast, for bronze can be made only by casting. How thin the bronze originally was when cast we have no knowledge, but whatever its thickness it must have been hammered, probably many times, being annealed each time to prepare it. Reduced to the proper thickness by whatever process, it was bent by hammering, probably repoussé, into the proper form, usually, if not always, in two pieces. The edges, being brought together, are fastened by any of the various methods of riveting. Fig. 190 is a representation of the details of the operation of riveting as employed in fig. 189. Sometimes the strips of thin bronze were laid on the outside as well as inside and the rivets put through three instead of two thicknesses. This was the case with fig. 187. While these workmen must have had knowledge of the art of soldering (shown in their gold work by the attachment of collars, rings, etc.), yet none of these instruments are reported as having been thus made.

Several of these instruments had been broken in ancient times and mended by the prehistoric workman. The methods of doing this show that in prehistoric times, as well as early Christian times, the metal workers of Ireland were of a high order and possessed of a degree of skill greater, probably, than any in Europe at the same period. The display in the Museum of Science and Art in Dublin of gold, silver, and bronze work, dating earlier than the eleventh century, will demonstrate the truth of this proposition. Reproductions in baser metal made by Mr. Edward Johnson, an antiquarian jeweler of Dublin, were displayed in the British section at the Chicago Exposition and were admired by all who had the good fortune to see them.

The instruments cast in molds were mended by a process called "burning," i. e., pouring molten metal on the junction of the broken pieces until they were themselves melted, when the old and the new metal would be fused into a solid mass and the break repaired. Occasionally this produced an enlargement, as in the case of fig. 183. In other specimens the ends or edges of the broken pieces were brought together and brazed. This was the usual course when mending broken bronze swords or daggers. Yet many times these swords, with other broken objects, were sent to the foundry for recasting. Fourteen thousand broken pieces of this or similar kinds were found together, forming part of the great prehistoric bronze foundry in Bologna, Italy. Where the bronze had been hammered, the process of reparation was by dovetailing or by riveting, and sometimes both. Fig. 190 represents the details of one of these processes.

Fig. 179 represents a curved bronze trumpet molded and cast, found at Portglenone, County Derry. It measures $24\frac{1}{2}$ inches on its outside curve. It has the end stopped and a mouth hole in the side, flute fashion, as shown in the drawing.¹

¹ Sir John Evans, *Ancient Bronze Implements*, p. 361, fig. 444.

Fig. 180 represents another bronze trumpet molded entire with closed end and lateral mouth hole, flute fashion. It is from Tralee, county Kerry, and was described by Mr. Robert Day.¹ It, like fig. 183, has been broken across the mouth hole and repaired by pouring hot metal around the fracture until it was melted and united. The mouth



Fig. 179.

BRONZE HORN.

County Derry, Ireland.

 $\frac{1}{2}$ natural size.

hole is on the concave portion, while in the other two (figs. 179 and 183) the mouth holes are on the side—that is, midway between concave and convex.

Fig. 181 represents a bronze horn with rows of spikes at either end, but otherwise without decoration. The ends are open, but the mouth-piece is gone. This instrument was molded and cast, and the imperfect adjustment of the molds has produced ridges, extending from one end to the other, on the convex and concave sides. It has been broken and mended in ancient times by the process of “burning in,” elsewhere

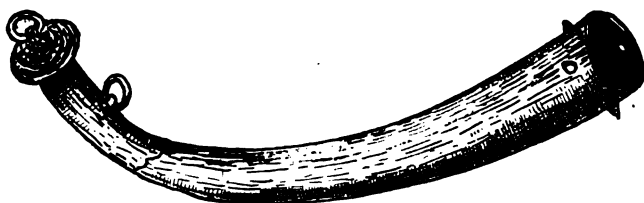


Fig. 180.

BRONZE HORN, BROKEN AT THE MOUTH HOLE AND REPAIRED.

Tralee, County Kerry, Ireland.

described. It was part of the “Dowris find,” is 24 inches long on the convex side, 2 $\frac{1}{2}$ inches in greatest diameter with circular termination at small end.

Sir John Evans² reports a bronze trumpet, cast, belonging to the

¹ Journal of the Royal Historical and Archaeological Association of Ireland, 4th ser., III, p. 422.

² Ancient Bronze Implements, p. 360.

"Dowris find," as broken and mended in ancient times, the operation having been performed in a manner similar to that represented by fig. 184.

Some of the instruments from the "Dowris find" are in the British Museum.¹ They have a peculiar golden luster, attributed to the presence of lead. An analysis by Donovan² gave:

Copper	79.34
Tin	10.87
Lead	9.11
	<hr/>
	99.32

Fig. 182 represents a bronze trumpet, molded and cast in a single piece, of dark metal and strengthened at both concave and convex sides by projecting ridges, which emphasize those left by the molds. It is $22\frac{1}{2}$ inches on the convex side, is $2\frac{1}{2}$ inches at the large, and $\frac{7}{8}$ inch at the small, end. It is open at the small end with a projecting dowel tube to receive the mouthpiece, which is, however, lost, as is the case with all these instruments. There is a small, solid, ring loop as though for chain or cord for suspension. It was found near Cloghoughter Castle, County Cavan, associated with two others. Still another of the same shape, but slightly larger, was found at Roscrea.

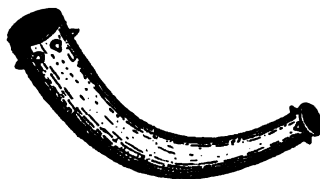


Fig. 181.

BRONZE HORN, CAST.

Length, 24 inches.

Museum of Science and Art, Dublin. Sir Wm. R. Wilde, Catalogue of Antiquities, Royal Irish Academy, I, pp. 627, 628, fig. 11.

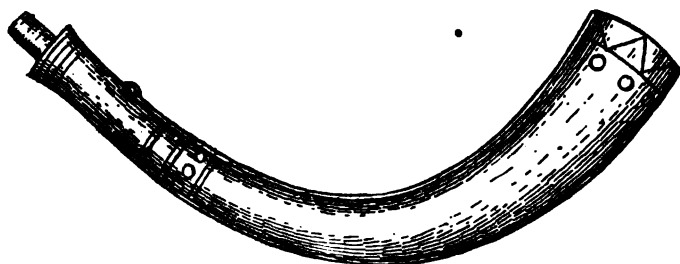


Fig. 182.

BRONZE HORN.

Length, $22\frac{1}{2}$ inches.

Museum of Science and Art, Dublin. Wilde, Catalogue of Antiquities, Royal Irish Academy, fig. 530, No. 6, p. 629.

Fig. 183 represents a trumpet which Sir W. R. Wilde³ says is one of the finest specimens yet discovered. It was molded, cast, and is of bright yellow bronze, preserved thus doubtless in the peat; is $34\frac{1}{2}$ inches in length on the outside and $3\frac{1}{2}$ inches in its greatest diameter. The small end is closed and decorated with a molded head $2\frac{5}{8}$ inches in diameter, finishing with a ring and eye. There is another ring

¹ Archaeological Journal, XII, p. 96.

² Von Bibra, Die Bronzen und Kupferlegirungen, p. 140.

³ Catalogue of Antiquities of the Royal Irish Academy, p. 629.

attached to the body of the instrument on the concave side and near the small end as though for a chain. The mouth hole is in the side or body of the instrument, flute fashion. Fig. 184 represents in detail the smaller end, showing that it has been broken across the mouth hole and how it was ingeniously mended by pouring hot metal around the fracture until the edges were melted and joined.

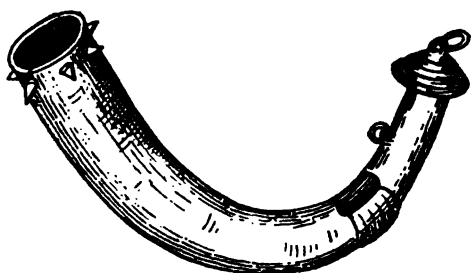


Fig. 183.

BRONZE HORN.

Derrymane, County Kerry, Ireland.

Museum of Science and Art, Dublin. Wilde, Catalogue of Antiquities, Royal Irish Academy, pp. 627-629.

not as a flute and, therefore, must have been as a horn or trumpet. There are rivet holes on the bell mouths of two of these horns, showing them to have been provided with flanges similar to fig. 187. Two of them have four protruding spikes near the bell mouth, which Mr. Day suggests may have been to add effect to blows in case the trumpets should be used as weapons, but this theory can scarcely be maintained, because (1) these instruments are not strong enough to withstand the crash of an effective blow, (2) the spikes are in the middle and on the small, (fig. 186) as well as on the larger end, and (3) they are on the straight tubes (fig. 191) of thin sheet bronze, so small as to be ineffective for any such purpose. Fig. 186 is peculiar in that while the outer end of the horn is curved, the near or small end is straight. It is made with two pieces fitted together,



Fig. 184.

DETAIL OF MOUTH HOLE OF FIG. 183.

Showing mode of repairing fractures by pouring on melted metal.



Fig. 185.

BRONZE HORN.

Tralee, County Kerry, Ireland.

Sir John Evans, *Ancient Bronze Implements*, p. 329, fig. 441.

sliding one in the other after the fashion of a jointed flute, and thus making it a firm and solid tube or pipe. One of these is straight and the other curved. The instrument is 50 inches long on its convex side, and 4 inches in diameter at its bell mouth.

Fig. 187 represents one of four trumpets found in a bog on Lough-

na-shade, County Armagh, in 1794. It is made of hammered sheet bronze, in two pieces, bent longitudinally and placed together to form the cylindrical tube as shown. Its seams were fastened by riveting; a strip of sheet bronze half an inch in width is laid upon the seam internally

(as in fig. 190a) and the two thicknesses of bronze are fastened together by rivets seven-eighths of an inch apart. The lower part of the instrument has been patched in several places by plates and collars riveted on. The upper part of the instrument was joined in the same way, but apparently ruder. The bell mouth of the instrument is finished with the large ornamented cast boss shown in fig. 188. The boss is $7\frac{1}{2}$ inches in diameter and has its peculiar ornamentation. The instrument is about 6 feet in length measured on the convex curve.

The greatest trumpet in the Dublin Museum of Science and Art is shown in fig. 189. It

was found in 1809 at Ardrin, in County Down. It is 8 feet 5 inches long on the convex side, is $3\frac{1}{2}$ inches diameter

at the largest and $\frac{5}{8}$ inch at the smallest end. It is of sheet bronze, yellowish red, bent and fastened with rivets, as in the specimen, fig. 187, but finer and of better workmanship. Fig. 190 a, b, shows the method of riveting adopted. The strap and rivet heads are on the

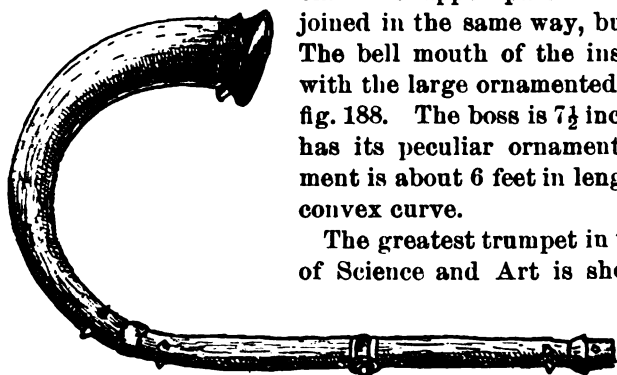


Fig. 186.
BRONZE HORN.
Tralee, County Kerry, Ireland.
Evans, Ancient Bronze Implements, fig. 440.

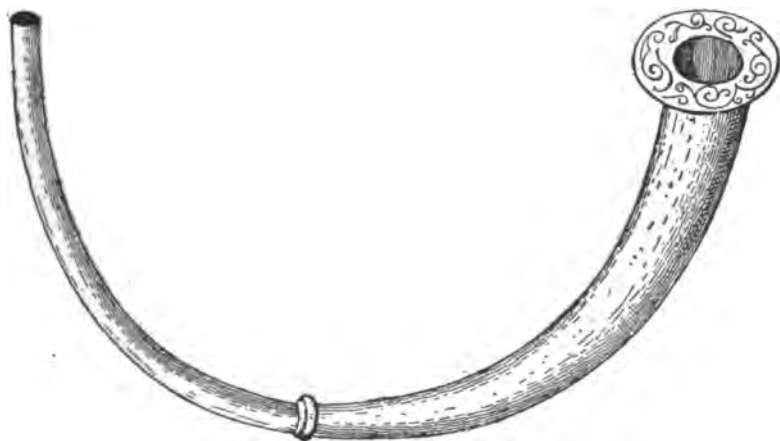


Fig. 187.
HORN OF HAMMERED SHEET BRONZE.
Length, 6 feet.

In Museum of Science and Art, Dublin. Wilde, Catalogue of Antiquities, Royal Irish Academy, pp. 625-627, 630, fig. 527, No. 8.

inside (a), with no strap on the outside. The edges are brought close together, holes punched, rivets inserted and hammered down (b). The mouthpieces of figs. 187 and 189 both were lost.

Fig. 191 represents a hollow tube similar in appearance to that in

fig. 186. It is $24\frac{1}{2}$ inches long, $1\frac{1}{2}$ inches in diameter, with four circles of spikes, four spikes in each circle. Sir W. R. Wilde¹ is of the opinion



Fig. 188.

DETAIL OF ORNAMENTED CAST BOSS ON BELL
MOUTH OF FIG. 187.
Diameter, $7\frac{1}{4}$ inches.

that this instrument served as the handle of a battle-ax or commander's baton or staff. But Sir John Evans² is of a different opinion. Both he and Mr. Ousley class it as an instrument of music. A similar instrument, also of bronze, 24 inches in length, found associated with other bronze trumpets at Dunmanway, County Cork, is in the British Museum.³

Among the horns belonging to the Museum of Science and Art, Dublin, is one of willow wood, 6 feet 4 inches long, $3\frac{1}{2}$ inches in diameter at the large end and tapering straight to the small end, where it is supposed

a mouthpiece was fixed, which is, as usual, gone. The piece of wood, originally solid, was split, hollowed out through the center from end to end, replaced and bound together with a strip of brass or bronze

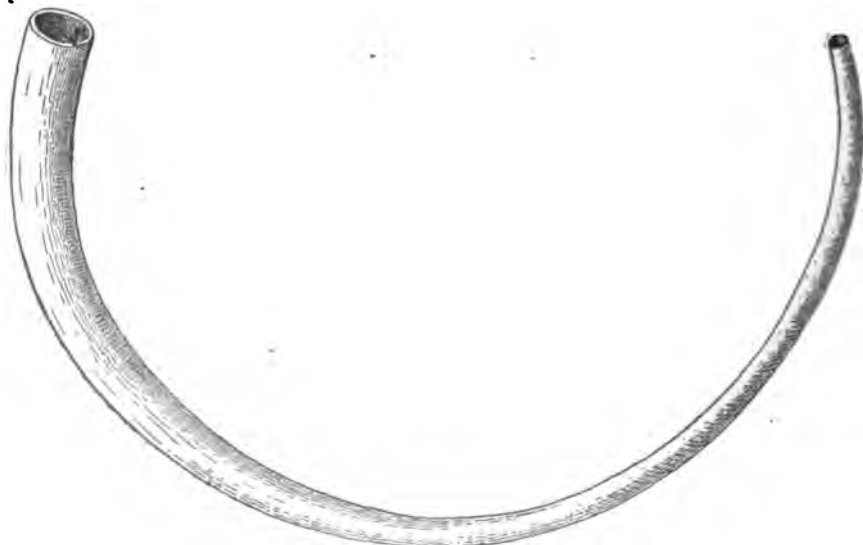


Fig. 189.

HORN OF HAMMERED SHEET BRONZE.

Length, 8 feet 5 inches.

In Museum of Science and Art, Dublin.

Wilde, Catalogue of Antiquities, Royal Irish Academy, pp. 625, 631, fig. 528, No. 9.

¹ Catalogue of Antiquities of the Royal Irish Academy, I, p. 492, fig. 360.

² Ancient Bronze Implements, p. 357, fig. 438.

³ *Idem.*, pp. 357, 358.

1½ inches in width, wound on the outside spirally from end to end and fastened with small brass or bronze nails. It was found in County Mayo, 1791, in a turf bog, about 9 feet beneath the surface, was perfectly straight and the wood sound, but since warped out of shape in drying.

Other pieces of wooden horns were found in 1837 in a bog at Killyfaddy, near Clogher, County Tyrone. These were made in the same manner as the foregoing, about 28 inches long, 2 inches in diameter, and with dowel tubes which fit together as a flute. (See figs. 186–191.) When put together they made a single tube 9 feet long and forming about two-thirds of a circle. Ralph Ousley, Esq., describes the foregoing objects in the *Transactions of the Royal Irish Academy*,¹ where he announced the opinion that these, especially the first, were “trumpets, called in Irish tales and romances ‘Benwoven or Buabhal, a military instrument used only in emergencies, and capable of producing a most tremendous sound.’”²

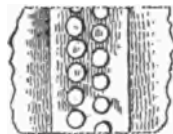


Fig. 190.

DETAIL OF JOINING OF THE EDGES OF FIG. 189.

(a) interior, showing the rivet heads; (b) exterior, showing where riveted down.



Fig. 191.

HOLLOW BRONZE TUBE.

Length, 24½ inches; diameter, 1½ inches; fragment, possibly a musical instrument.

Wilde, *Catalogue of Antiquities, Royal Irish Academy*, p. 492, fig. 360; and Evans, *Ancient Bronze Implements*, p. 337, fig. 438.

SCOTLAND.

Bronze horns.—Fig. 192 is a bronze trumpet, molded and cast, found in Ayrshire, Scotland, in the year 1654, and is known as the Caprington-



Fig. 192.

THE “CAPRINGTON HORN,” BRONZE, MOLDED.

Length, 25 inches.

Tarbolton, Ayrshire, Scotland.

Proceedings Society of Antiquaries, Scotland, XII, p. 565.

¹ Volume IV.

² Sir W. R. Wilde, *Catalogue of Antiquities of the Royal Irish Academy*, I, p. 244.

ton horn. It is described in *Proceedings of the Society of Antiquaries of Scotland*¹ and in Sir John Evans's *Ancient Bronze Implements*.² It is 25 inches in length, and is more curved at the large than at the small end. Its analysis is given in the latter authority:

Copper	90.26
Tin	9.61
Loss .....	.13
	<hr/>
	100.00

ENGLAND.

Bronze horns.—According to Sir John Evans—³

English trumpets of bronze belonging to prehistoric times are of rare occurrence. One found in the River Witham, Lincolnshire, has been figured in the *Philosophical Transactions*,⁴ and is nearly straight for the greater part of its length (about 28 inches), curving upward near the end into an irregularly-shaped expanding mouth. It has an ornament or crest like a mane along the exterior curve. In form it is not unlike the *carnyx*, which is brandished by the horseman on the coins of the British princes Eppillus and Tasciovanus,⁵ and which also appears on some Roman coins and monuments commemorative of Gallic and British victories. The metal on analysis gave copper 88, tin 12, and the tube was formed from a hammered sheet and soldered with tin. It not probably belongs to a period not far removed from that of the Roman invasion of this country.



Fig. 193.

BRONZE BELL, MOLDED.

Dowris find, Ireland.

Museum of Science and Art,
Dublin.

Wilde, *Catalogue of Antiquities*,
Royal Irish Academy, pp.
612, 613, fig. 523.

Another, with two joints and a perfect mouthpiece, is said to have been found at Battle, Sussex, and has been engraved by Grose.⁶

Bells or rattles.—Sir John Evans⁷ reproduces a bell or rattle “formed of a hollow egg or pear-shaped piece of bronze with a pebble or piece of metal inside by way of clapper.” Fig. 193 represents this object. It is to be noted that this bell bears a great resemblance to the prehistoric ones found in Mexico. Sir John Evans continued his description, which is here given entire because of the frequent suggestion made that the Mexican bells were of European manufacture. The only reasons for this belief is their similarity of form and appearance with those manufactured in Europe, and that

¹ Volume XII, p. 565.

² Page 362, fig. 445.

³ *Ancient Bronze Implements*, p. 363.

⁴ Volume LXXXVI, 1796, plate XI; *Horæ Fer.*, plate XIII; *Arch. Journ.*, XVIII, p. 150.

⁵ Evans, “*Ancient British Coins*,” plate III, No. 11, and plate V, No. 10, etc.

⁶ *Ancient Armour*, plate XIII; Gough's *Camden*, IV, p. 231.

⁷ *Ancient Bronze Implements*, p. 364, fig. 446.

ancient explorers, especially those from Spain, mention hawks' bells as objects of trade with the aborigines:

The only (similar) examples which I am able to adduce are those which formed part of the Dowris hoard (Ireland), one of which is represented in fig. 446. There are three such in the Royal Irish Academy and four in the British Museum. With the latter is a smaller plain bell of the same character and two unfinished castings. Sir W. R. Wilde observes that in casting, the metal appears to have been poured into the mold by an aperture at the side, through which the core of clay that contained the metal clapper was broken up. The mold was in two halves and the rings and staples at the ends were cast together. In the perfect examples at the British Museum the sides of the holes by which the core was extracted have been hammered together, so as in some cases to be almost closed. In one instance there is some appearance of the sides having been brazed together.

The sound emitted by these bells is dull and feeble. Like the modern horse bells, a number of them may have been hung together, and not improbably employed in a similar manner to attract the attention both of the eye and the ear.

This bell was part of the "Dowris find," Kings County, Ireland (as was the trumpet, fig. 181), described in Sir W. R. Wilde's catalogue,¹ who says that they were of great antiquity may be inferred from the character of the metal of which they are composed, as well as the circumstances under which they were found. They were believed to have been the ecclesiastical bells used by the Druid priests, and as such have been called "crotals," but there is not sufficient authority to state this confidently. A number of these, and others more spherical, have been found in Ireland. The globular ones are $1\frac{1}{4}$ to $2\frac{3}{4}$ inches in diameter, while the specimen represented in fig. 193 is $6\frac{1}{2}$ inches long, including the ring, and $2\frac{2}{5}$ inches in diameter. We shall later refer to specimens of great similarity found in Mexico and Central and South America regarding which a priori theorists have jumped at the conclusion that because of this similarity with modern and Old World forms they were imported, or at least were white man's work. We shall also see how Prof. W. H. Holmes, in his paper on "Ancient art of the Province of Chiriqui,"² denounces and upsets this theory.

GAUL.

Trumpets, or war horns.—Fig. 194 represents one of the prehistoric Gaulish trumpets, or war horns. It belongs to France. No complete original of this has ever been found, but from fragments and from a representation upon the Roman triumphal arch at Orange, archæologists have been able to reconstruct and reproduce it. On that arch a Gaulish soldier is represented as sounding his trumpet, from which it is supposed to have been a war trumpet. The other objects of bronze and of gold found and identified as belonging to Gaul at and prior to the Roman conquest demonstrate the entire capability of these people to make such instruments, while the discovery of the fragments and partially destroyed pieces establishes affirmatively the fact of their

¹ Page 613.

² Sixth Annual Report of the Bureau of Ethnology, p. 51 et seq.

existence. Roman historians of the time of Cæsar have reported and described these instruments from Gaul, and Polybius¹ says that—

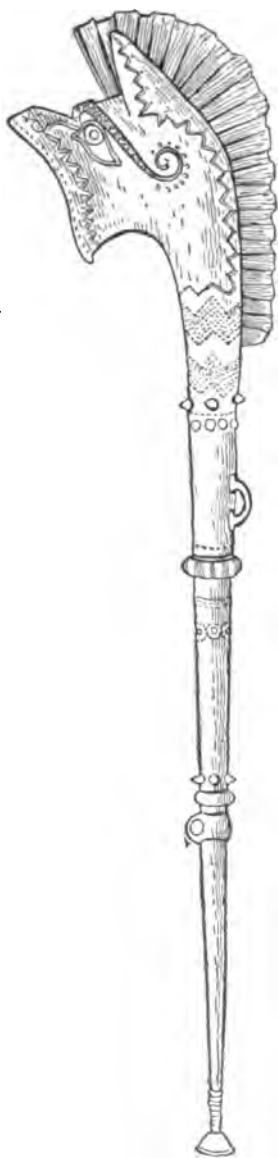


Fig. 194.

BRONZE WAR TRUMPET (Carynx),
CAST.

Used in Gaul, in the time of Cæsar. After
Grenet.

The parade and tumult of the army of the Celts terrified the Romans, for there was amongst them an infinite number of horns and trumpets which, with the shouts of the whole army in concert, made a clamor so terrible and loud that every surrounding echo was awakened, and all the adjacent country seemed to join in the horrible din.

Diodorus² says of the Gauls that they had barbaric trumpets of a special nature which gave a hoarse sound well suited to the din of battle. The use of war trumpets among the Celtic population of western Europe has been more than once mentioned by classic writers, and passages from them have been cited by Sir John Evans, Sir Augustus W. Franks, and others.³ Smith's Dictionary of Greek and Roman Antiquities describes the lituus as a sort of trumpet slightly curved at the extremities, differing both from the tuba and cornu, the former being straight and the latter bent into a spiral. Lydus calls the lituus the sacerdotal trumpet, and says it was employed by Romulus when he proclaimed the title of his city. Acro asserts that it was peculiar to cavalry, while the tuba belonged to infantry. Its tones are characterized as harsh and shrill. The Roman lituus seems to have been much the same shape as the figure here given (fig. 194), which was called the carynx, the end of which was sometimes made to represent the fanciful head of an animal.

A horn, not prehistoric, but of high antiquity and well known in ancient history, is that of Charlemagne, preserved in the treasury of the cathedral of Aix-la-Chapelle. It is ivory, and was made from a veritable elephant tusk. A cast of it is in the museum of the Conservatory of Music in Brussels (No. 1158), and its scale (obtained from this copy) is from C flat below, to F within, the staff.

¹ Liber II, chap. 29.

² Liber v, chap. 30.

³ Livy, Liber v, chaps. 37 and 39.

ETRURIA.

The only mention by Dennis of music or musical instruments as having been found in Etruria is that of—

A singular spear or rod with a number of movable disks which might have been rattled together so as to keep time, and which, as it was found in connection with armor and weapons, seems to mark it for military use and may have served as an accompaniment to a band. A similar instrument was found in the neighborhood which had on its top the figure of a naked man dancing.¹

This describes the tintinnabulum which was in use in different parts of the eastern hemisphere in prehistoric times. This instrument is figured and described in De Mortillet's "*Musée Préhistorique*"² and in Wilson's "*Swastika*"³ as found from India to the Swiss Lake dwellings.

There have been several specimens, the handiwork of prehistoric man, found in his graves or stations, cited by authors on music, not themselves archæologists, under the supposition that these were musical instruments; but this is only a hypothesis and subject to confirmation by future discovery. The *Archæological Journal*, 1864, reports the discovery of a bone which Professor Owen pronounced to be that of the Irish elk. It was found in a moat at Desmond Castle, Ireland, and was thought to have formed part of a musical instrument, notably the Irish lyra. The uncertainty of this contention is apparent when it is noted that other persons equally, and perhaps better, qualified to judge, gave it as their opinion that it formed part of a crossbow. Others have reported the tusks or teeth of cave bear, dog, and other animals, found with holes drilled, one can now almost say with certainty, for suspension, but the musicians have tried to convert them into whistles. This they do by saying that to stop the hole on the opposite side and blow as in the cylinder of a key it will make a whistling sound.

Other individuals have supposed that pieces of hard stone, notably jade, with one or more holes drilled therein, were used as musical instruments, because when suspended and struck, they gave forth a sonorous sound. This is not impossible, but it is improbable.

There are in the United States National Museum scores of objects of jade which have been sawed and otherwise elaborately carved and worked, and which have been drilled with one or two holes. (Plates 39, 40.) It also has, as does every other collection, gorgets and so-called ceremonial objects, drilled as for suspension, all of which are, to a certain extent, sonorous and will emit a musical tone when struck; but the same thing is equally true of any reasonably large flake or blade of flint or obsidian. The large chalcedonic spearheads from Arkansas, the flint, rhyolite, and chalcedonic leaf-shaped implements will likewise emit a sonorous sound when suspended and struck. It is evident

¹ Dennis, *Etruria*, II, p. 444.

² Fig. 1230.

³ Page 799, fig. 29.

that none of these were ever intended for musical instruments, and this effectually disposes of the claim that the former objects were so used. Almost any piece of steel, or even iron, certainly glass, made in modern times, will emit a sonorous sound; but when these materials are utilized in the construction of musical instruments, that intention is always apparent. (See p. 526.)

The United States National Museum possesses a large, interesting, and valuable collection of musical instruments, which have been obtained primarily through the interest of the late Dr. G. Brown Goode, the assistant secretary of the Smithsonian Institution, in charge of the National Museum. Very many of these are extremely primitive and might well have served in prehistoric times. Their use by savages and primitive peoples in the earliest stages of their history shows an almost certain connection with prehistoric times. It has, therefore, been considered proper that they should be noticed among prehistoric instruments.

The Museum has also published various memoirs and ethnological papers, reports of travels, descriptions and catalogues of collections, wherein savage and primitive musical instruments have been figured. It is deemed wise to employ this material so far as it relates to or will elucidate the subject in hand so that it may be brought together, and, so far as possible, a view of prehistoric musical instruments, especially those in the United States National Museum, presented.

The principal among these publications are: "The Shofar, Its Use and Origin,"¹ by Dr. Cyrus Adler, curator of oriental antiquities; "Notes on the Ethnology of Tibet,"² by William Woodville Rockhill; "The Indians of the Northwest Coast,"³ by Lieut. Albert P. Niblack, United States Navy; "Ethnology of Ungava District, Hudson Bay Territory,"⁴ by Lucien M. Turner; "A Study of Siouan Cults,"⁵ by J. Owen Dorsey; "The Point Barrow Esquimo,"⁶ by John Murdoch. These will be employed in connection with unpublished Museum material, and the whole arranged geographically.

PALESTINE AND SYRIA.

Dr. Cyrus Adler, speaking of the shofar,⁷ says:

It is not only the solitary musical instrument actually preserved in the Mosaic ritual, but is the oldest form of wind instrument known to be retained in use in the world. (Musical Instruments, Historic, Rare, and Unique, by A. J. Hipkins, Edinburgh, Black, 1888, p. 12; and Musical Instruments, by Carl Engel, London, 1875, South Kensington Museum Art Books.) * * * Professor Steinthal pointed out

¹ Report U. S. Nat. Mus., 1892, pp. 437-450, plates xcvii-c.

² Report U. S. Nat. Mus., 1893, p. 715, plate xxiv.

³ Report U. S. Nat. Mus., 1888, pp. 329-364, plates lviii-lxii.

⁴ Eleventh Annual Report of the Bureau of Ethnology, 1889-90, p. 259.

⁵ *Idem*, p. 455.

⁶ Ninth Annual Report of the Bureau of Ethnology, 1887-88, pp. 385-389.

⁷ Report U. S. Nat. Mus., 1892, p. 437, plate xcvii.



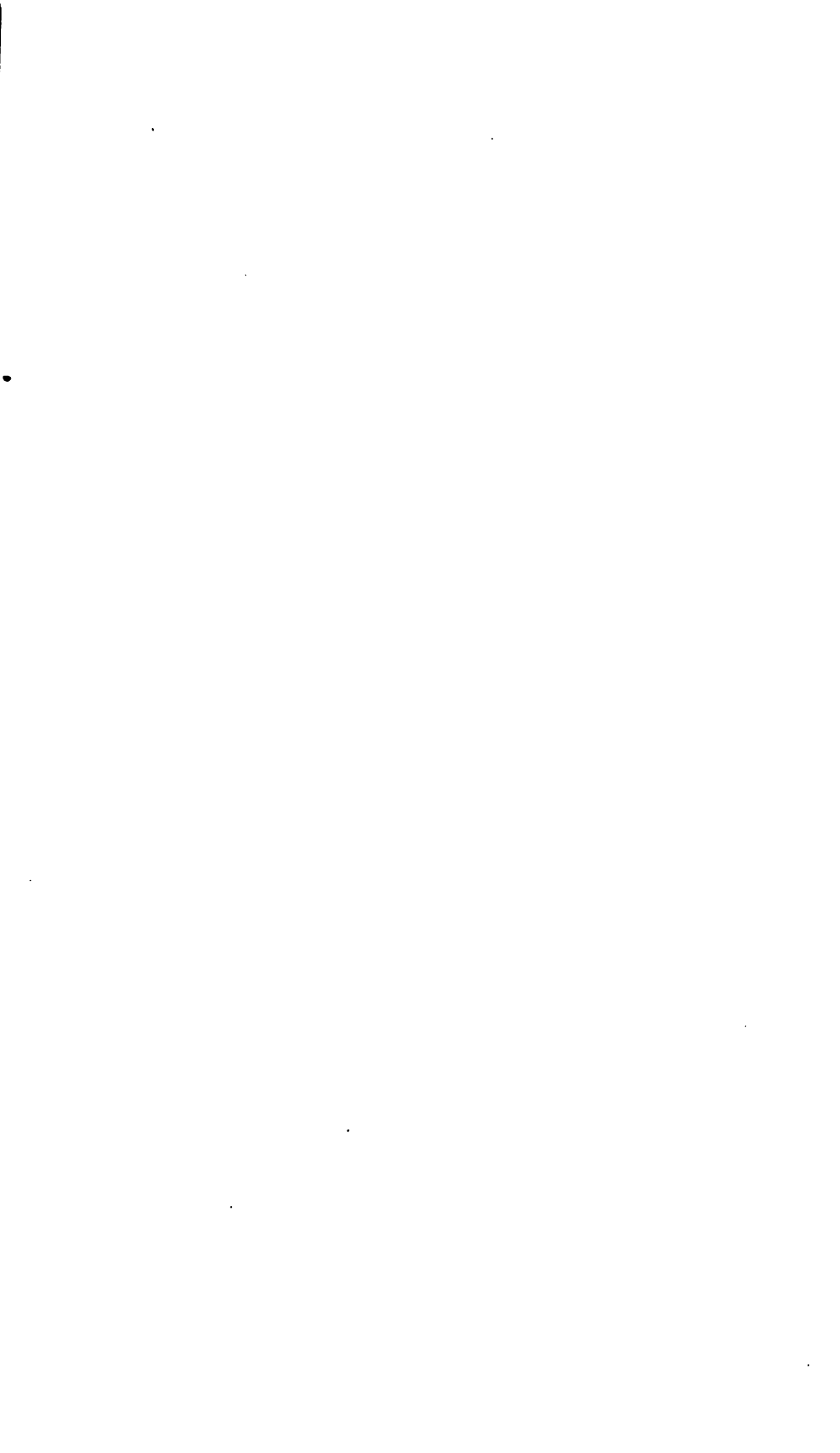
SHOFARS AND OTHER HORNS.

Palestine and Syria.

Adler, Report U. S. Nat. Mus., 1892, plate xcvi.

EXPLANATION OF PLATE 68.

- Fig. 1. MODERN SHOFAR, ORDINARY FORM.**
(Cat. No. 154402, U. S. N. M.)
- Fig. 2. SHOFAR, ITALIAN FORM.**
(Cat. No. 95142, U. S. N. M.)
- Fig. 3. AFRICAN WAR HORN (antelope).**
(Cat. No. 4960, U. S. N. M.)
- Fig. 4. SHRINGA.**
(Cat. No. 92709, U. S. N. M. India.)
- Fig. 5. SIAMESE COPPER HORN.**
(Cat. No. 27293, U. S. N. M.)
- Fig. 6. LARGE AFRICAN WAR HORN OF IVORY.** From plaster cast in U. S. National Museum. (Original in museum of Wesleyan University, Middletown, Connecticut.)
(Cat. No. 94892, U. S. N. M.)
- Fig. 7. SMALL AFRICAN WAR HORN OF IVORY.** From plaster cast in U. S. National Museum. (Original in museum of Wesleyan University, Middletown, Connecticut.)
(Cat. No. 94893, U. S. N. M.)
- Fig. 8. IVORY WAR HORN.**
(Cat. No. 127193, U. S. N. M. Byanzi, Africa.)
- Fig. 9. AFRICAN WAR HORN.**
(Cat. No. 5412, U. S. N. M.)
- Fig. 10. EMBUCHI; IVORY WAR HORN.**
(Cat. No. 4793, U. S. N. M. Pala Ballas, Africa.)
- Fig. 11. IVORY WAR HORN.**
(Cat. No. 4793, U. S. N. M. West coast of Africa.)
- Fig. 12. IVORY WAR HORN.**
(Cat. No. 127195, U. S. N. M. Byanzi, Africa.)



that this was an instrument no doubt used in prehistoric times. * * * (p. 448).

Wetzstein is of the opinion that the use of the ram's horn may have been borrowed by the Israelites, and goes back to a people who were engaged solely in the care of sheep. By these it was used as a signal of alarm. * * * (p. 438). There seems to be little doubt that it has been continuously used in the Mosaic service from the time it was established until now. * * * The shofar was not the only natural horn used by the Israelites as a musical instrument, but no copies or representations of the other instruments have come down to us.

The shofar is described at length by Dr. Adler, together with the regulations as to its use and the reference made to it in the Bible. He says (p. 446):

From the Talmud we learn that the use of the shofar as a note of alarm of war was transferred to other seasons of danger and distress. Famine, plague of locusts, and drought (Mishna Taanith, I, 6) occasioned the blowing of the shofar.

The shofar was employed at the public ceremony of excommunication. (Wetzstein, p. 67.)

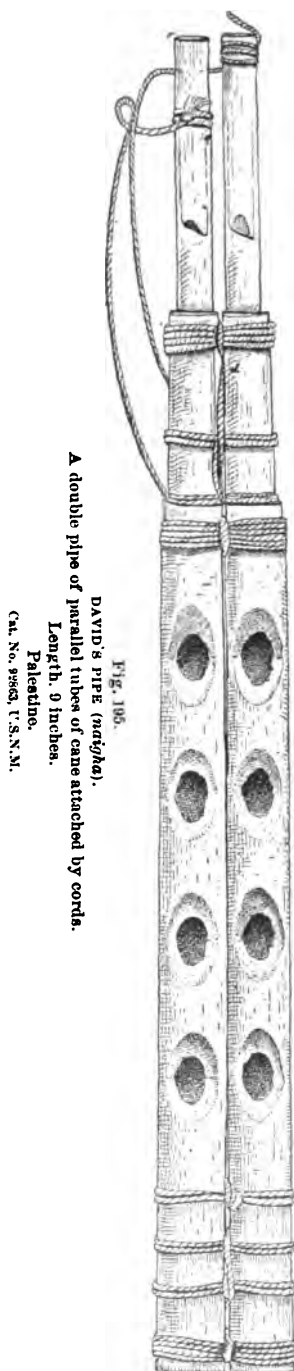
A very curious use of the shofar in later times was in funeral ceremonies. (Wetzstein, p. 67.) I agree with Wetzstein that this use of the instrument is quite apart from the usual Semitic custom, and it was probably borrowed.

As a signal instrument of war it has its various uses, possibly according to the note that was blown. It was the signal for going out to battle, for the announcement of a victory, and for a recall of the troops.

He figures many shofars on plates XCVII-C, which are fully described, and to which reference is made for further information. But in the plate first mentioned he shows many aboriginal horns similar to the shofar, principally from Africa.

Figs. 1 and 2, plate 68, are shofars (his plate XCVII) assigned to Palestine and Syria. They are described as made of a ram's horn straightened and flattened by heat. The bore of the instrument is a cylindrical tube of very small caliber, which opens into a kind of bell of parabolic form.

Fig. 195 is labeled as a Naigha, David's pipe, from Palestine, a double pipe of two parallel tubes of cane attached by cords. Each tube has four finger holes. The mouthpieces are



made separate and inserted in the smaller ends. They are close together and are intended to be blown both at the same time. The instrument is of the clarinet type. Vibrating reeds are attached to these small mouthpieces by cords wound about them at the outer end, leaving the inner end free for vibration. The free ends of the cords by which the parallel tubes are bound are attached to the mouthpieces to prevent loss. The length of this instrument is $9\frac{1}{2}$ inches, the diameter of the tube is $\frac{1}{2}$ inch, of the mouthpiece $\frac{1}{4}$ inch. (Gift of A. B. Karny.)

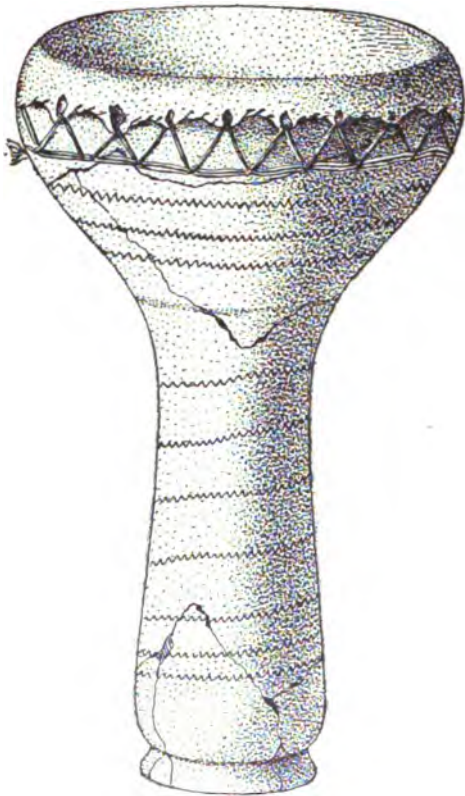


Fig. 196.

POTTERY DRUM (*derbouka*).

Beirut, Syria.

Cat. No. 95147, U.S.N.M.

Fig. 196 represents a pottery drum from Syria. (Collected by Erhard Bissinger, United States consul.) The shell is of red earthenware in the shape of a longitudinal section of a bottle. It has a parchment head stretched, stitched, and glued in place. The pottery is decorated with incised zigzag lines nearly equidistant throughout the length of the instrument. It is $16\frac{1}{2}$ inches in height, and its respective diameters are $3\frac{1}{4}$ and $10\frac{3}{8}$ inches.

The musical instruments of the Bible are not considered in this paper other than Dr. Adler's reference to the shofar. They will be well known to all readers, and their presentation here would only be a work of collation. They are of sufficient antiquity to be classed as archaeologic, and could well have a place in any work on

the history of music; but the people who used them had an enlightened civilization, and the instruments themselves were far from being prehistoric, although they may have been primitive.

INDIA.

Fig. 4 (Plate 68) represents the shringa, a common ox or buffalo horn scraped and polished, the tip cut off, and a hole made or enlarged in the end, half an inch in diameter, to serve as a mouthpiece. This enlargement is made with a hot iron, without any attempt to spread or stretch

the horn or to form a cup-shaped mouthpiece, as has been done so frequently with similar instruments, both ancient and modern. Of this instrument Dr. Adler says (p. 449):

In form it differs in nowise from the shofar. It is an ancient outdoor wind instrument commonly known as the Indian horn, and was the favorite instrument of the Hindu god Siva. * * * The metallic descendant from the Indian buffalo horn, the shringa, is the rana-shringa, an outdoor instrument made of copper, formerly used in military, and now universally in religious processions throughout India, both by Hindus and Mohammedans, the performers usually being Hindus of the lower caste. In the villages of southern and central India the watchmen blow it at sunset and at certain hours of the night, like the German *nachtrichter*. In large cities a hornblower is always attached to the police. There is seldom a guard or detachment of native irregular troops without one. It is employed in all processions, temple services, marriages, and other festive occasions, and at funerals. [See Capt. Meadows Taylor, Proc. Roy. Irish Acad., IX, plate I, p. 110.] Another trumpet of the same class is the kurna, used chiefly in religious processions, or in festivals in honor of local divinities. Only Brahmins and persons of a certain rank are permitted to use the kurna. It is esteemed by all Brahmins to be the most ancient instrument of music in existence, and the sound of it to be especially pleasing to the gods in various particular ceremonies and at solemn parts of the sacrifice.

This particular specimen is black in color, $12\frac{1}{2}$ inches in length, and $2\frac{1}{2}$ inches in its greatest diameter.

The conch shells of India, like those of some other countries, have the apex ground or cut off until a hole is opened, sometimes directly, sometimes laterally, which forms a mouthpiece. The natural cavity of the shell forms the bore. Specimen, Cat. No. 92711 (U.S.N.M.) is a horn called Shanka, made from a shell of the *Turbenella pyrum* which has been treated in the same manner. Its length is 6 inches, diameter $3\frac{3}{4}$ inches. Specimen, Cat. No. 92712 (U.S.N.M.) is a horn named Gomukha, and made from a cassis or helmet shell. Its length is 10 inches, diameter $8\frac{1}{4}$ inches. Specimen, Cat. No. 92713 (U.S.N.M.), a shell (*Pterocera*), has been treated in the same manner and made into a horn called Barataka. Length $11\frac{1}{2}$ inches, width $4\frac{1}{2}$ inches.

TIBET.

The musical instruments of the Tibetans, while not prehistoric, are quite primitive. They are described by Mr. Rockhill, in his "Journey through Mongolia and Tibet," published by the Smithsonian Institution, as drums (yang ko ku), gongs, cymbals, and tambourines (t'ai-p'ing ku), and figured in his "Notes on the Ethnology of Tibet,"² wherein he describes them more at length. Those employed in religious observances or in church ceremonies are the small hand drum (damaru), frequently made of children's skulls and covered with snake skin, and the bell (drilbu). On his plate 40, figs. 1 and 2 are damarus, of which fig. 2 is made of two skulls attached by a wooden disk. Heads of devils and skulls are painted on them in red and blue colors. A small cotton

¹ Pages 56, 57, 59, and 336.

² Report U. S. Nat. Mus., 1893, pp. 715-739, plates 24, 40, 41.

band covers the disk between the two heads and projects a few inches, so as to be held in the hand. Fig. 1 is smaller and the skulls are not painted, but the band is of embroidered satin, decorated with elaborately knotted Chinese silk tassels. The bell (drilbu) is of bronze and usually about 2½ inches in diameter. His figs. 4 and 5, plate 41, represent such bells. Fig. 4 is made in Derge, famous for its clear-toned bells. Fig. 5 comes from the famous Lamasery of Dolonnor, eastern Mongolia. Musical instruments belonging to Tibet, exclusive of those used in religious worship, plate 69 (his plate 24), are (1) the whistle (ling-bu, figs. 1-3) of bamboo or the bone of an eagle's wing, with six or seven key holes; (2) the jew's-harp (k'a-pi, figs. 4-6), and (3) the banjo or guitar (piwang, kopong, or dra-nyan), with three or more strings. The latter is not figured by Mr. Rockhill. The figures of the former sufficiently explain themselves, but the jew's-harp is here described because of its occurrence among distant savage peoples.

Mr. Rockhill says:

The jew's-harp is made not by the Tibetans, but by the Lissus and other non-Tibetan tribes inhabiting southeast Tibet, and is a favorite instrument in eastern Tibet, where nearly all the women carry one suspended from their girdles. Three harps are used simultaneously, each giving a different note; the deepest note is called p'o kü or "male sound," the intermediate one ding kü or "middle sound," the sharpest one mo kü or "female sound." They are held the one below the other in the order above given between the thumb and the index finger of the left hand, and struck with all the fingers of the right hand, the one after the other. These k'a-pi are carried in small bamboo cases ornamented with little rings of bamboo, often dyed, and also with geometric carvings, which are also colored. They are shown in the lower portion of this plate.

Jew's-harps similar to those used in Tibet are found among the Ainu and in New Guinea, but in many other countries where a bamboo harp is used, the sound is produced by jerking the harp by a string. This is the case in Assam, in parts of Sumatra, among the Yakuts, the tribes of Torres Straits, etc. (p. 715.)

EGYPT (THEBES AND CAIRO).

Fig. 197 represents a tube of cane with four finger holes (collected by Dr. George Sampson). Its length is 5 inches, its diameter ½ inch. In the upper end of this tube another piece of cane, the outside



Fig. 197.

SINGLE REED INSTRUMENT (zoommarah).

Thebes, Egypt.

Cat. No. 74899, U.S.N.M.

diameter of which is equal to the inside diameter of the former tube, is inserted, projecting 1½ inches; this forms the mouthpiece of the instrument. To prevent its loss the mouthpiece is attached to the tube with a cord.

EXPLANATION OF PLATE 69.

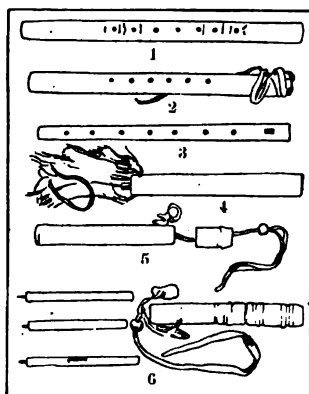


Fig. 1. BAMBOO WHISTLE. Bat'ang.

(Cat. No. 167165a, U. S. N. M.)

Fig. 2. BAMBOO WHISTLE. Bat'ang. Strap to tie to girdle.

(Cat. No. 167165b, U. S. N. M.)

Fig. 3. EAGLE BONE WHISTLE. Kokonor Tibetans.

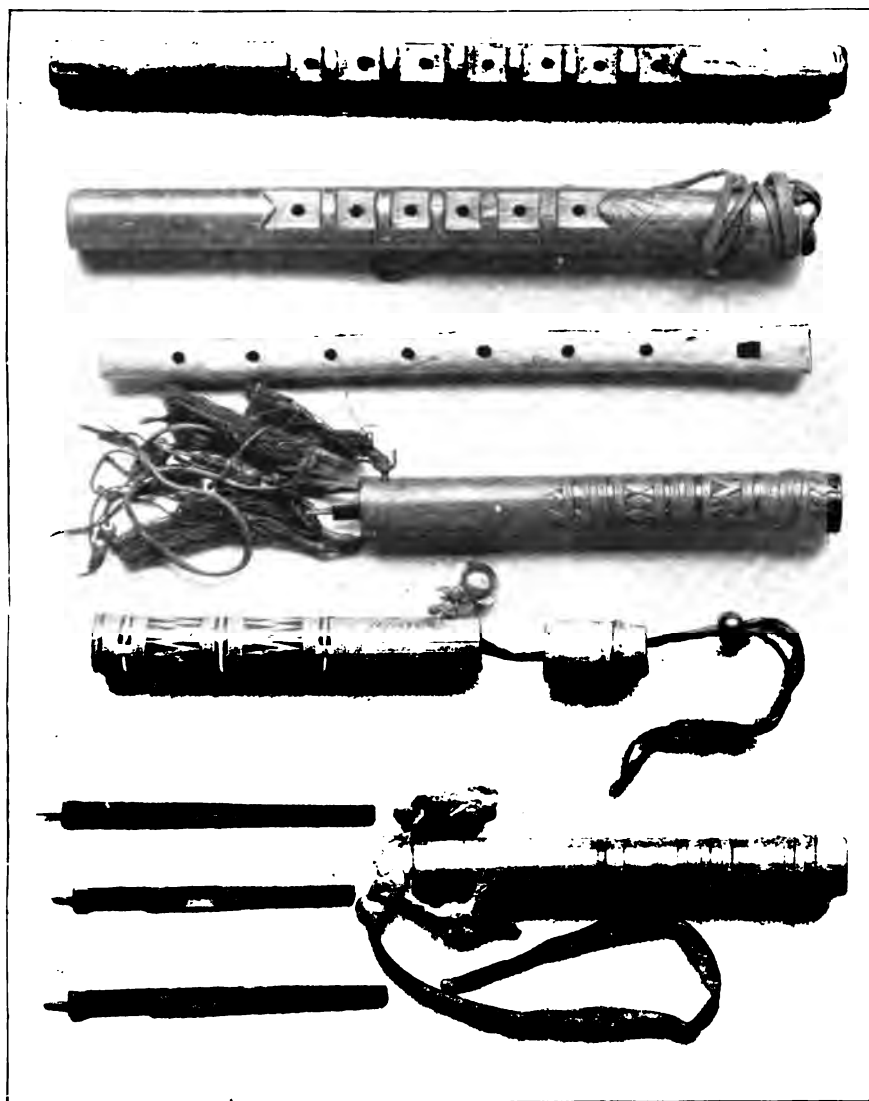
(Cat. No. 167166, U. S. N. M.)

Figs. 4, 5. BAMBOO JEW'S-HARP CASES. Bat'ang.

(Cat. Nos. 167168e and 168168c, U. S. N. M.)

Fig. 6. BAMBOO JEW'S-HARP AND CASE. Bat'ang.

(Cat. No. 167168d, U. S. N. M.)



WHISTLES AND JEW'S-HARPS.

Tibet.

Rockhill, Report U. S. Nat. Mus., 1893, plate 24.

The instrument is of the reed type, as is shown by the figure. The slip of reed is cut from the mouthpiece against which it lies; the outside end is tied with a thread, and the inside end is left free for vibration. The reed is shaved thin near its fastened end to render it more elastic.

Specimen, Cat. No. 95198 (U.S.N.M.) is a trumpet from Muzmar el Daraweesh, probably made from a rhinoceros horn. It is curved, is lenticular in cross sections, and the bell mouth is bifurcated with notched edges. It has three lugs formed on its outer curved edge, in which are inserted four brass rings. The bore is slightly enlarged at the smaller end to form a cupped mouthpiece. Length, 20 inches; width, 1 to 5 inches; thickness, $\frac{1}{2}$ to $\frac{1}{4}$ inch. It is from Cairo.

AFRICA.

Fig. 3, plate 68,¹ represents an African war trumpet made from the horn of an antelope. The natural cavity of the horn forms the bore of the instrument. The smaller end, however, has not been cut off, but is left pointed as in nature. About one-fourth the distance from the pointed end a lateral opening has been made into the original cavity which forms a mouthpiece, and through this the instrument is blown.

Figs. 6 to 12 in same plate represent war horns from different parts of Africa. They are mostly ivory, and made of elephant's tusks or rhinoceros horn. The natural cavity of the tusk forms the bore. In some cases the horn has been left in its natural state with a lateral mouth hole cut in the concave side as in the shringa. Others, however, are made by cutting off the end and a direct mouth hole worked out of the solid. The localities of these instruments are indicated in the legends.

Fig. 12, plate 68, represents an elephant tusk 4 feet 4 inches in length on the convex side. It has been carved so as to reduce its size considerably and made much more pointed than natural. At the distance of 33 inches from the large end a lateral opening has been made which forms a mouthpiece. This is elliptical and has been enlarged so as to be cup shaped. From the mouthpiece to the large extremity the natural cavity of the tusk forms the bore of the instrument.

Specimen, Cat. No. 95227 (U.S.N.M.) is a wooden horn (Nanga) from Mayumba, Africa, collected by Mr. Carl Strehelmann and received from Mr. George C. Webster. It is carved from a solid block of soft light-colored wood. The bore is made with a burning iron. The small end has an enlarged cup-shaped mouthpiece. Its smallest diameter is 1 inch. It increases gradually to near the large end, where it expands with a bell mouth to 4 $\frac{1}{4}$ inches. It is 28 inches long. The entire exterior has been originally blackened, apparently by fire, while a section of 11 inches at the larger end is decorated by incised lines cut

¹ Report U. S. Nat. Mus., 1892, plate xcvi.

in the burnt wood, which, by bringing out the light color of the interior, shows in circles, lozenges, zigzag, chevron, and festooned forms.

Specimen, Cat. No. 174752 (U.S.N.M.) is a whistle of pottery in the form of a hollow cylinder with two projecting lugs from opposite sides. The mouth hole, three-fourths of an inch in diameter, is at the upper end. At the opposite end is a finger hole three-sixteenths inch in diameter. There is also a finger hole through one of the lugs. The opposite lug is perforated for suspension. It is sounded by blowing across the larger hole and the different notes produced are as follows:



Length, $4\frac{1}{2}$ inches; diameter, $1\frac{1}{2}$; width across lugs, $3\frac{1}{8}$ inches. Tribe Bakorua, from Sankura, Africa.

Dr. W. L. Abbott describes the "Ethnological Collections in the United States National Museum from Kilimanjaro, East Africa."¹ The locality is thus identified:

A little south of the equator and about 175 miles from the coast of East Africa, rises the splendid mountain Kilimanjaro. It covers an area as great as the Bernese Overland and its greatest peak—Kibo—is over 20,000 feet in height, capped with glaciers and eternal snows. The nearest port on the coast is Mondasa, now the headquarters of the British East African Company.

Dr. Abbott's paper is illustrated by photographs of this primitive people. The list of musical instruments, all of them from the Wa Changa tribe, Mount Kilimanjaro, East Africa, is as follows:

Rattles.—Large iron bell with two balls as sounders; worn by women during pregnancy, on the lower part of the thigh. Length, $4\frac{1}{2}$ inches. (Cat. No. 151577, U.S.N.M.)

Rattles.—Two small semilunar iron bells, tied to a thong; worn on the ankles. (Cat. No. 151575, U.S.N.M.)

Ankle rattles.—Iron bells, semilunar in shape, with sounders of iron balls, fastened in pairs to a thong of leather and worn on the ankles in dancing. (Cat. No. 151576, U.S.N.M.)

Drum.—Tube of wood closed at one end, with a skin head. Used to call the population to arms. It is carried under the left arm and beaten with right hand. Length, 4 feet 2 inches; diameter, $4\frac{1}{2}$ inches. (Cat. No. 151584, U.S.N.M.)

Cow bell.—A piece of iron, wrought thin and cut in shape of a dumb-bell, then bent at the center so as to form a rude bell, with a clapper attached to the narrow portion at the top. (Cat. No. 151578, U.S.N.M.)

Cow bell.—Native ironwork, similar to Cat. No. 151578. (Cat. No. 151579, U.S.N.M.)

Fig. 198 *a*, *b*, represents one of three rattles from Mayumba, Africa. (Collected by Mr. Carl Strechelman.) Its length is $3\frac{1}{2}$ inches, width, $1\frac{1}{8}$, and thickness, $1\frac{1}{8}$ inches. It is double—that is, with rattle at each end, intended to be held in the middle. It is of dark-colored soft wood, the outside charred and then ornamented by incised lines in squares, parallels, chevrons, herringbones, etc. Fig. 198*a* represents a complete drawing, while fig. 198*b* is a longitudinal section showing the interior construction, the formation of the double bell, the clappers of wood, three in number within each bell, and their attachment by an endless

¹Report U. S. Nat. Mus., 1891, p. 381.

cord which passes through the holes in the clappers and through the body of the bell on each side so that it can be tied or joined. The instrument will be better understood by an examination of the figure.

ISLANDS OF THE SOUTH PACIFIC OCEAN, POLYNESIA.

Fig. 199 represents the Pandean pipes, or Pipes of Pan, from the Fiji Islands. (Collected by Mr. J. M. Brower, United States consul.) Four pieces of cane of different lengths are placed together parallel and fastened by fine wire which has been passed around each of the four and then drawn into several strands between each cane respectively,

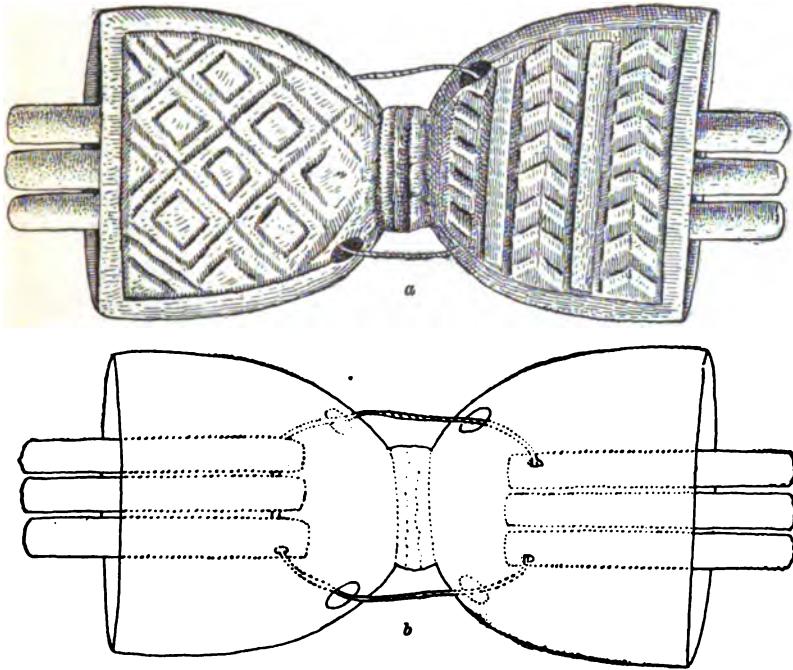


Fig. 198.

WOODEN RATTLE.

a, completed drawing; b, longitudinal section.

Mayumba, Africa.

Cat. No. 95716, U.S.N.M. $\frac{1}{2}$ natural size.

thus forming a solid piece. The open ends are on a line, their orifices charred smooth, and the lower ends are closed by being cut at a joint of the cane. The longest cane is 4 inches in length, the shortest 3 inches, and their diameter about $\frac{3}{16}$ inch.

The Greek god Pan is represented as playing on this instrument, blowing in the open holes as he passed them back and forth on his lips, each pipe sounding a different note.

Specimen, Cat. No. 2827 (U.S.N.M) is a war drum, so called, from the Fiji Islands. It is hollowed out like a trough from a log of hard

dark-redwood. The bottom is convex like a cask or barrel. No head of skin is used, as in all drums of modern manufacture. When used it is placed on a coil of rope. It is from Somu-Somu, Fiji, and was collected by the Wilkes Exploring Expedition. It is 55 inches in length, 16 inches in width, and 18 inches in height. The native name for this instrument is lali, and the following description is taken from the label displayed in the United States National Museum:



Fig. 199.

PANDEAN PIPES.

Levuka Island, Fiji.

Cat. No. 23942, U.S.N.M. $\frac{2}{3}$ natural size.

The tavola tree of Fiji (*Terminalia catappa*) is said to make the best sounding lalis, although the ves tree (*Azelia bijuga*) is also used. "The sides are beaten by two sticks about 18 inches long. In different ways measures or tunes are beaten on them, the meaning of which is known by the natives and the 'old hands' or settlers. The sound of the lali is not unpleasant when beaten by a practiced hand, and a good-sounding one may be heard at a distance of 4 or 5 miles on a quiet evening."—(Horne, *A Year in Fiji*, p. 114.)

Commodore Wilkes, in his Narrative of the United States Exploring Expedition, states that this drum was given to him by Tiu Thakan, a chief of the island of Somu Somu, together with a thousand yams, in exchange for a musket—the usual price—and a whale's tooth in token of friendship. "After the drum had been presented to me," he continues, "I was desirous of hearing them beat upon it. They have several beats or calls to give notice to the koro (or village), one of which was for calling the people together to the feast of human bodies. They were all distinct and, they said, quite audible at a great distance. The Fiji drum is similar to that described at Tonga, and is made of a log hollowed out and placed on one point. It gives out a deep, hollow tone when struck with the small and large sticks with which they produce the different sounds."—(Vol. III, p. 317.)

SAMOA.

Specimen, Cat. No. 3466 (U.S.N.M.) is a conch shell used as a war horn (Pu or Fou-foa) with mouth hole 3 inches from apex. Length of shell, $7\frac{1}{2}$ inches; width, 5 inches.

Specimen, Cat. No. 3825 (U.S.N.M.) is a war horn from Carlshoff Island. It is made from a conch shell (*Triton tritonis* Linnæus) and is covered with a lime deposit.

SPAIN.

An extremely primitive instrument in the United States National Museum (Cat. No. 95554) is marked Los Huesos, (the bones) Spain, but otherwise the record is silent. It is a rattle of eight leg bones of a sheep, each perforated near the ends and strung on two cords, making

the instrument like a ladder. The sound is made by the bones being rasped one or both ways with another bone or piece of shell. Length, $4\frac{1}{2}$ inches; width, 5 inches.

NORTH AMERICA.

The United States National Museum possesses several primitive, if not entirely prehistoric, musical instruments, gathered by divers persons, most of them operating in the line of ethnology or prehistoric archæology, not a few of whom have been officers of the United States Government who have turned over their collections to the Museum on returning to Washington.

Pursuing a plan of description by geographic distribution, we begin at the extreme north.

ALASKA.

Point Barrow.—Mr. John Murdoch, in his paper on the Point Barrow Eskimo,¹ says:

The only musical instrument among these people is the universal drum or tambourine (*Aelyau*), consisting of a membrane stretched over a hoop with a handle on one side. It is used from Greenland to Siberia. It is always accompanied by the voice, singing or chanting. It produced a loud, resonant, and somewhat musical note. There appears to be no system of tuning these drums, the pitch of the note depending entirely upon accident.

Mr. Murdoch figures one of these, here reproduced as fig. 200, which is simply a hoop like that of a tambourine, oval, 22 by 19 inches, with a short handle attached. The membrane is a sheet of the peritoneum of a seal stretched over a hoop after the style of a tambourine. The United States National Museum possesses four of these drums, of which Mr. Murdoch says that "every Eskimo household possesses at least one."

The expedition brought home eight handles for these drums which exhibit but slight variations. The commonest material for the handle is walrus ivory; only two out of twelve are of antler. Their length is from 4.6 to 5.4 inches. Fig. 201 *a-d* represents a series of these drum handles taken from Mr. Murdoch's paper. With one exception, all these handles have the large end more or less rudely carved into a human face with the mouth open as if singing. The one exception is fig. *c*, which is the butt end of a small walrus tusk carved to represent a walrus. It has small oval bits of wood inlaid for eyes. The notches by which these handles are fitted into the rim of the tam-

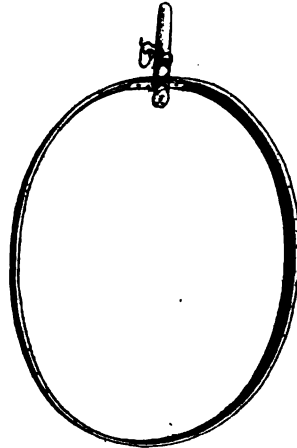


Fig. 200.

ESKIMO DRUM.

Point Barrow, Alaska.

Cat. No. 56741, U.S.N.M. $\frac{1}{2}$ natural size.

¹ Ninth Annual Report of the Bureau of Ethnology, 1887-88, p. 385.

bourine, and the holes by which it is withed fast are plainly shown in the figures.

Captain Herendeen was interpreter for Captain Ray and accompanied the party during the entire expedition. He is now employed in the

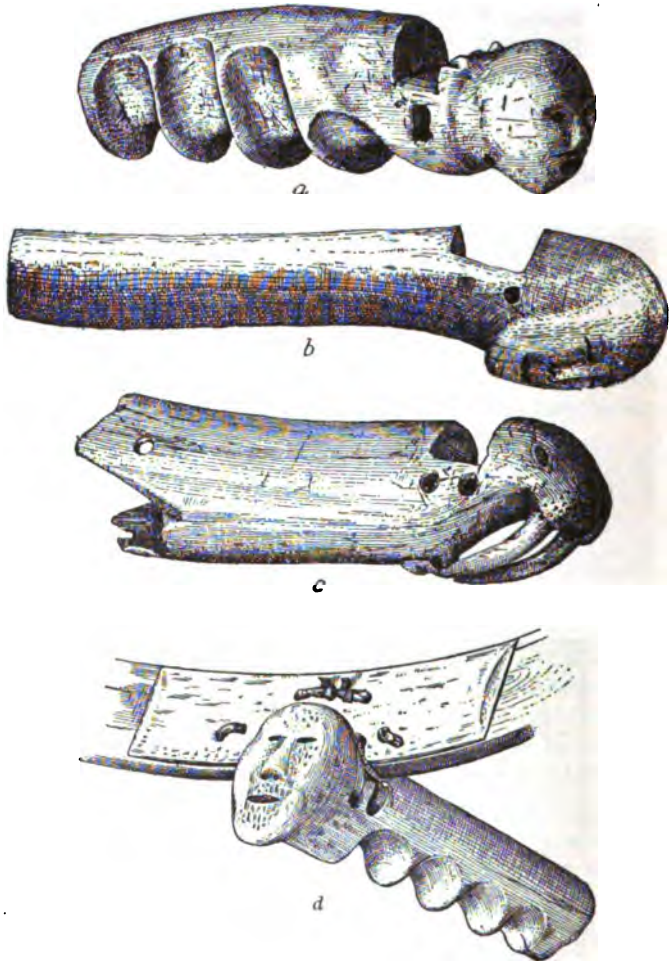


Fig. 201.

HANDLES FOR ESKIMO DRUMS.

Point Barrow, Alaska.

Cat. Nos. (a) 89267, (b) 89266, (c) 56514, (d) 56742, U.S.N.M. $\frac{1}{2}$ natural size.

National Museum, and I have asked for his knowledge about Eskimo musical instruments, to which he replies:

The principal machine to be called a musical instrument is the tambourine-like drum.

These drums are carried everywhere by the Eskimo. He beats it when happy, when sad or sick accompanies himself with his dirge-like songs, drives away evil

spirits that torment his family when sick. It is a universal panacea for all the ills of life and a fountain of delight on festive occasions.

Many objects are strung on strings and tied to the belt, notably on little boys; often a small brass bell is thus attached.

Fig. 202 represents a bunch or string of the dewclaws of the woodland caribou, which have been trimmed at the point so as to make an opening, and have been notched at the wide end, probably for decora-

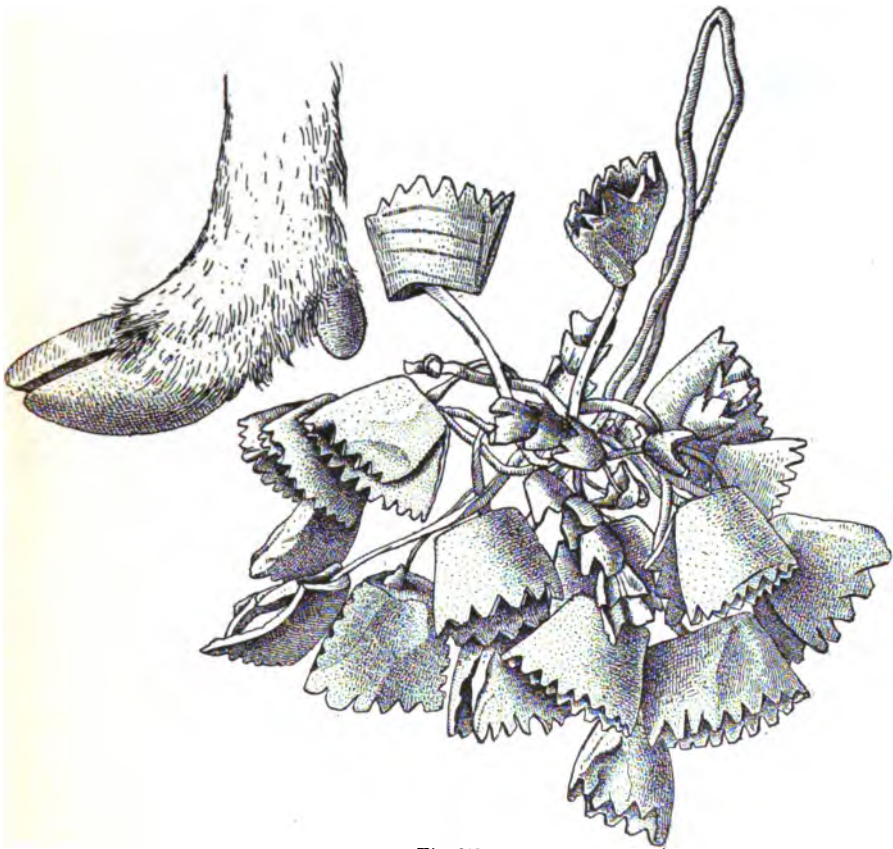


Fig. 202.

RATTLE OF CARIBOU DEWCLAWS.

McKenzie River district, Fort Anderson Eskimo.

Cat. No. 1443, U.S.N.M.

tion. They are eighteen in number. Interspersed with them are several strings of ptarmigan beaks. This is one of the musical instruments mentioned above by Captain Herendeen. The string or loop by which it was attached is shown in the figure. We can imagine the music made by this instrument when attached to the belt of a running, jumping, playing boy. It serves the same purpose in music as does the dulcimer, which, by the latest fad of society people, is hung upon the door of the young ladies' boudoir, with bullets suspended from long

strings, which, being agitated by the closing door, strike the wires, making music whenever the door is moved.

Mr. Murdoch¹ gives a better report of the musical abilities of the Point Barrow Eskimo. He says:

Their music consists of monotonous chants, usually with very little perceptible air, and pitched generally in a minor key. I could not perceive that they had any idea of "tune," in the musical sense, but when several sang together each pitched the tune to suit himself. They, however, keep excellent time. The ordinary songs are in "common" or 4-4 time. The words are often extemporaneous, and at toler-

able regular intervals comes the refrain, "A yáña, yáña, a yáña ya," which takes the place of the "ámna aja" of the eastern Eskimo. Sometimes, when they are humming or singing to themselves, the words are nothing but this refrain. Their voices, as a general thing, are musical.

Like all Eskimo, they are very fond of music, and are constantly singing and humming to themselves, sometimes, according to Captain Herendeen, waking up in the night to sing. Besides their regular festivals they often amuse themselves in their houses by singing to the drum. They are fond of civilized music and, having usually very quick and acute

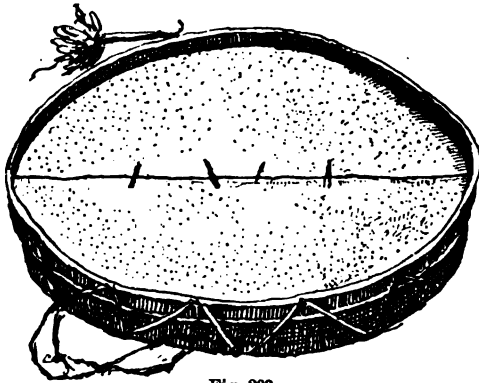


Fig. 203.

DRUM.

Neuenot, Hudson Bay Eskimo.
U. S. National Museum.

ears, readily catch the tunes, which they sing with curiously mutilated words. We found "Shoo fly" and "Little Brown Jug" great favorites at the time of our arrival, and one old woman from Nuwuk told us with great glee how Magwa (McGuire) used to sing "Tolderolderol." Our two violins, the doctor's and the cook's, were a constant source of delight to them.

HUDSON BAY ESKIMO.

Mr. L. M. Turner,² speaking of the Hudson Bay Eskimo, says:

The only musical instrument used by these people is the drum or tambourine of the form shown. These drums vary in diameter from 22 to 26 inches. The membrane for the drumhead is a thin reindeer skin tanned.

Fig. 203 represents one of these drums from Neuenot.

Across the membrane is stretched a sinew cord on which are strung at right angles to the cord a number of barrels, made from the quills of the wing feathers of the willow ptarmigan. Across the underside of the membrane is stretched a similar cord with quills.

Mr. Turner figures and describes a similar drum used by the Little Whale River Indians, which drums, he says, differ greatly in construction from those of the Ungava Indians.

The size is rarely so great, seldom exceeding 22 inches. These drums have two

¹ Ninth Annual Report of the Bureau of Ethnology, 1887-88, pp. 388, 389.

² Eleventh Annual Report of the Bureau of Ethnology, 1889-90, pp. 324-326.



**MEDICINE AND DANCE DRUM. TANNED SHEEPSKIN STRETCHED OVER A
WOODEN FRAME. TOTEMIC FIGURE, THE BEAR.**

Tlingit, Sitka, Alaska.

(Niblack, Report U. S. Nat. Mus., 1888, fig. 302, plate LVII.)

Cat. No. 127613, U.S.N.M. Collected by Paymaster E. D. Webster, U. S. N.





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WOODEN WHISTLES AND TRUMPETS.
Indians of Northwest Coast.

EXPLANATION OF PLATE 71.

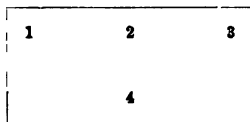


Fig. 1. DANCE WHISTLE. In form of a toy balloon, with a bladder attached to wooden mouthpiece to operate the whistle.

(Cat. No. 89068, U. S. N. M. Haida, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Niblack, Report U. S. Nat. Mus., 1888, fig. 298, plate LVII.)

Fig. 2. DANCE WHISTLE. With double reed mouthpieces backed with bellows. The cheeks of the bellows are painted, representing Hoorts, the bear.

(Cat. No. 89064, U. S. N. M. Haida Indians, Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Idem, fig. 329, plate LXII.)

Fig. 3. CEREMONIAL TRUMPET. Made in six pieces (see fig. 4, this plate), which, when joined, form six chambers, in each of which a piece of fabric is stretched. The different tones are not set to a scale.

(Cat. No. 20687, U. S. N. M. Tsimshian, Fort Simpson, British Columbia. Collected by James G. Swan. Idem, fig. 301, plate LVII.)

Fig. 4. WOODEN TRUMPET. Five-chambered.

(Compare with fig. 3, this plate. Idem, fig. 119, plate LXI.)





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WOODEN WHISTLES AND TRUMPETS.
Indians of Northwest Coast.

EXPLANATION OF PLATE 72.

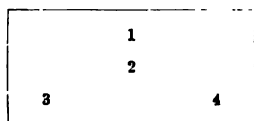


Fig. 1. DANCE WHISTLE. Blown like a fife. Compare fig. 2, this plate.

(Cat. No. 89057, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Niblack, Report U. S. Nat. Mus., 1888, fig. 299, plate LVII.)

Fig. 2. CEREMONIAL WHISTLE.

(Cat. No. 89057, U. S. N. M. Skidegate, Queen Charlotte Islands, British Columbia. Collected by James G. Swan. Idem, fig. 326, plate LXI.)

Fig. 3. CEREMONIAL TRUMPET. Of wood; made in two sections, with reed between.

(Cat. No. 20689, U. S. N. M. Taimshian, Fort Simpson, British Columbia. Collected by James G. Swan. Idem, fig. 324, plate LXI.)

Fig. 4. CEREMONIAL TRUMPET. Of wood; in section, to show the vibrating piece.

(Cat. No. 20695, U. S. N. M. Taimshian, Fort Simpson, British Columbia. Collected by James G. Swan. Idem, fig. 327, plate LXI.)

heads or membranes, fitted on the barrel and secured by a single hoop for each head. The two hoops are then connected by tightening strings. The membranes are invariably made of deerskin in the parchment condition and not of tanned skins.

The snares or thongs across the heads have pieces of wood instead of quills as rattlers. The drumstick, like that of the Ungavas, is of reindeer horn, or else, as if to add to the din, a gun-cap box is pierced through from side to side and a few pebbles or shot placed within. A stick is then inserted through the hole in the box, and the whole covered with buckskin to prevent separation of the lid and box. This makes a distracting noise.

Turner, describing the use of the drum, says:

Nothing is done, nothing contemplated, without sounding the drum. It is silent only when the people are asleep or on a tramp from one locality to another. If a person is ill the drum is beaten; if a person is well the drum is beaten; if prosperous in the chase a drum is beaten, and if death has snatched a member from the community the drum is beaten to prevent his spirit from returning to torment the living. The drumbeat is often accompanied with singing, which is the most discordant of all sounds supposed to be harmonious.

NORTHWEST COAST.

"The Indians of the Northwest Coast" is the title of a paper by Lieut. Albert P. Niblack, U. S. N., based on collections in the United States National Museum and on personal observation in connection with the survey of Alaska in the seasons of 1885, 1886, and 1887. The locality most affected was the coast and islands in southern Alaska and northern British Columbia. The musical instruments which he found were drums, whistles, and rattles, which are described in his paper.¹

Drums.—The usual type of drum is that shown on plate 70 (his plate LVII), which consists of a piece of deerhide or sheepskin stretched across a circular wooden hoop. They are similar, though not identical, with the drum of the Point Barrow and Hudson Bay Eskimo heretofore described. It has the bear as a totem. It is beaten with an ordinary bass drumstick.

Whistles.—Whistles are shown in great variety on plates 71 and 72 (his plates LXI and LXII). Some of these devices make a hideous noise, especially such as fig. 1 (plate 71), consisting of a wooden whistle and a bladder like a toy balloon, or fig. 2 (plate 71), a whistle backed by a pair of bellows to furnish the wind. The most elaborate instrument of this kind is shown in figs. 3 and 4 (plate 71), both being views of the same; the former put together ready for use, the latter showing the pieces in detail. It consists of six pieces of wood, forming a kind of trumpet with five openings, a continuous narrow band of silk being stretched through these openings. It is blown from the small end, trumpet-fashion, when each section gives forth its sound on a different pitch. Figs. 1 and 2 (plate 72) are views of the same kind of instrument blown flute fashion. The other instruments are like a flageolet, some of them having several finger holes to change the notes. Fig. 3 (plate 72)

¹ Report U. S. Nat. Mus., 1888, pp. 331, 332, plates LVII, LXIII.

has a reed or vibrating piece within, as shown in the sectional view (fig. 4).

Rattles.—These are usually of cedar, generally in sections neatly joined, elaborately carved, and painted with appropriate totem designs. The usual form is a hollow wooden chamber with a dozen or more small pebbles in it. The most primitive mentioned by the early voyagers is composed of two hoops joined by a wooden crosspiece, the circumference being closely strung with the beaks of the puffin.—(His fig. 73, plate XVIII.)

Lieutenant Niblack witnessed one of the great ceremonial dances of these people at Fort Wrangell, September, 1887. Describing their music and musical instruments,¹ he says:

It consisted in raising the feet alternately in quick succession as high as possible, without moving the body, to the sound of a drum, chorus, and rattle.

He quotes Dawson's description of a dance:

* * * Some had rattles, and added to the din by shaking these furiously at the accentuated parts of the song. * * * The drum was beaten very regularly with double knocks, thus—tum tum, tum tum, tum tum—and with the sound the dancers kept time in a sort of chant or song. * * *

And from Laugadorff:²

One of the dancers seems, as it were, to lead the rest, carrying in his hand a thick sort of staff ornamented with the teeth of sea otters, which he struck upon the ground to mark the measure. * * * The women sit on the ground at a distance of some paces from the dancers and sing a not inharmonious melody, which supplies the music.

OREGON—(HUPA INDIANS).

Drums, rattles, and whistles.—Capt. P. H. Ray made an extensive ethnological collection from the Indians in the Hupa Reservation, which is described by Professor Mason in the Smithsonian Report for 1886.³

Speaking of the musical instruments, he says:

Rattles employed by medicine men and in gambling are composed of many hoofs and hooflets of the blacktail deer. Each piece is pierced through the apex and suspended on a short thread, upon which four white beads are also strung. These pendants are then fastened to a long belt of cloth or leather and worn around the waist or held in the hand. The hoofs striking together produce a sharp rattling sound. A small, graceful lens-shaped rattle, mounted on a stick, is held in the hand of the dancer. (Fig. 114, plate 73. His plate XXVI.)

The Hupa drum is a rectangular box, covered with leather, and has little merit as a musical instrument. (Fig. 118, plate 73. His plate XXVI.)

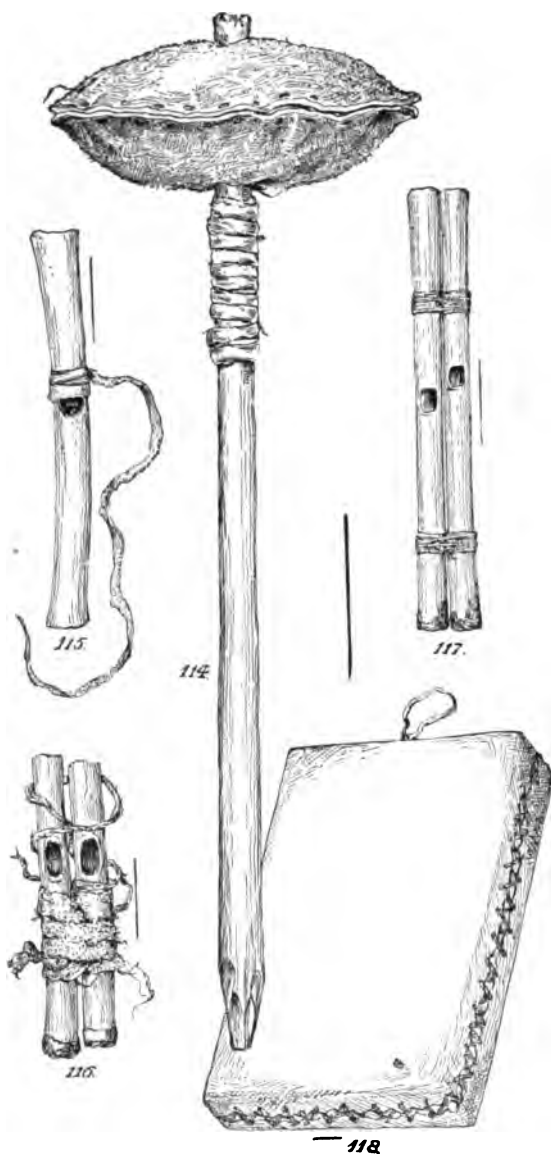
The Hupa make tolerably agreeable music on a small bone whistle, made either single or double. (Figs. 115–117, plate 73. His plate XXVI.)

Professor Mason concludes with the statement that by the similarity of these with the prehistoric instruments found in the ancient graves

¹ Report U. S. Nat. Mus., 1888, p. 364.

² Voyages, 1805, plate II, p. 114.

³ Part I, pp. 234, 235.



WHISTLES, RATTLE, AND DRUM.

Hupa Indians.

Collected by Gen. P. H. Ray, U. S. V.

Mason, Ray collection, Smithsonian Report, 1886, Pt. 1, plate xxvi.

of southern California and the islands of the coast the continuity of music in prehistoric times is made out, and he wisely observes (p. 235):

It is an important principle, which archaeologists sometimes overlook, that arts may survive and obey the laws of technic evolution even though the men through whose instrumentality they live and have their being have no immediate blood relationship.

To which the author is tempted to add that the survival of identical arts among peoples widely separated by time or space is not evidence of independent discovery or separate invention. The underlying idea of Professor Mason's statement is that this survival of similar arts must have been by teaching of some sort which could only have been accomplished by contact or communication intermediate between the peoples. While a similarity of arts (or of language) is not evidence of consanguinity between different peoples, yet it is evidence of a high order, sufficient in the absence of anything to the contrary, to carry conviction that there has been communication between them of some sort.

CALIFORNIA.

Bone whistles or flageolets.—There are in the Museum a number of bone whistles or flageolets, obtained from ancient graves on the California coast and the adjacent islands. The majority are made of the long bones of birds. The simpler forms are plain tubes of various lengths, one end being closed with asphaltum. In others a square or oval vent hole is cut; in most cases near one end, but sometimes nearer the middle. In many specimens there is a transverse ridge of asphaltum fastened to the inside of the tube immediately below the hole, which deflects the current of air over the edge of the hole and makes the musical tone as in a flageolet.

Fig. 204 represents a whistle of bone 3.4 inches in length, from Santa Cruz Island. (Schumacher collection.) One end is closed, and there is a transverse ridge of asphaltum within the tube beneath the vent hole. It is blown from the end, flageolet fashion, and emits but a single note, thus:



Fig. 204.

BONE WHISTLE.

Santa Cruz Island,
California.

Cat. No. 18323, U.S.N.M.
 $\frac{3}{4}$ natural size.

In fig. 205 is shown an instrument from La Patera, Santa Barbara County, on the mainland. Dr. C. C. Abbott,¹ speaking of this specimen, says:

It represents a large example of what we must consider a bone whistle, although in its present condition it would not be of use even in a musician's hands. As will be seen in the illustration, the end farthest from the lateral hole is closed, the mate-

¹Report upon U. S. Geographical Surveys West of the One Hundredth Meridian, VII, Archaeology, pp. 234, 235.

rial, as usual, being asphaltum, applied in a soft state, which closes perfectly the irregularly oval opening of the bone at the end. The opposite opening is more

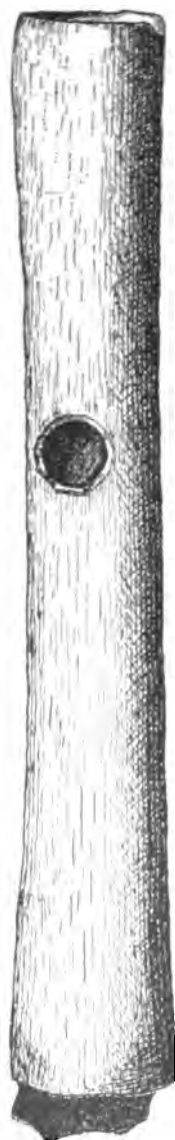


Fig. 205.
BONE WHISTLE.
La Patera, Santa
Barbara County,
California.
Cat. No. 62661, U.S.N.M.
 $\frac{1}{2}$ natural size.



Fig. 206.
BONE WHISTLE.
Santa Cruz Island,
California.
Cat. No. 18162, U.S.N.M.
 $\frac{1}{2}$ natural size.



Fig. 207.
BONE WHISTLE.
San Miguel Island,
California.
Cat. No. 29657, U.S.N.M.
 $\frac{2}{3}$ natural size.

nearly circular, and is now without any obstruction. The two ends have been cut or sawed off, and the edges are very smooth and even. The instrument, therefore, was

never longer than at present. It is made of a portion of a leg bone of some large mammal, and is $6\frac{1}{4}$ inches in length. The lateral opening, which is nearly an inch nearer one end than the other, is one-half inch in diameter. The external surface is smooth and even somewhat polished.

Fig. 206 represents a bone whistle from Santa Cruz Island. It has been coated with a black pigment, probably asphaltum, and has been rubbed or used until it shows a polished surface. It is made from the long bone of a bird, and has the natural opening throughout the interior. About 2 inches

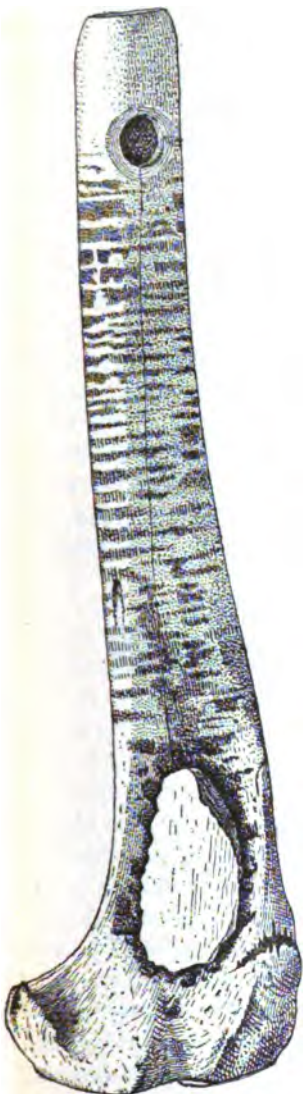


Fig. 208.

BONE WHISTLE.

San Clemente Island, California.

Cat. No. 172843, U.S.N.M. $\frac{2}{3}$ natural size.

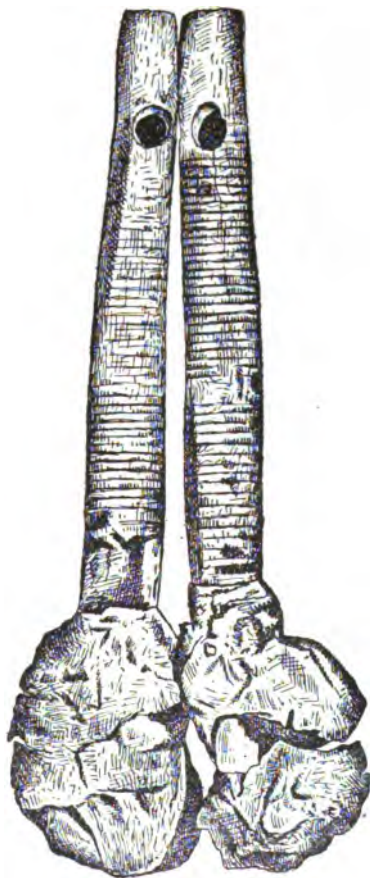


Fig. 209.

DOUBLE BONE WHISTLE.

San Clemente Island, California.

Peabody Museum, Cambridge, Massachusetts.

from one end a square hole has been cut in the bone, and just beneath it is a transverse ridge of asphaltum. A note or sound is obtained by blowing into the end nearest the vent hole.

Fig. 207 represents a bone whistle from an ancient grave on San Miguel Island, California (Bowers collection). It is made from a tibia of the deer (*Cariacus virginianus*). The upper end has been cut off, the cellular portion of the bone removed, and a side hole placed about $1\frac{3}{8}$ inches from the open end. Opposite this opening and extending to the end on the inside are remains of gum or asphaltum, which formed an air passage on the principle of the modern flageolet. By restoring this with clay, I was enabled to get a sound or note on the instrument thus:



There are two other whistles of like form from Santa Cruz Island (Cat. Nos. 26273 and 26274 U.S.N.M.), but so much cracked and weathered that no attempt was made at restoration.

Fig. 208 represents one of three instruments lately received from Mr. J. Neale Plumb, of New York. They are from San Clemente Island, and were obtained by Mr. Plumb during the summer of 1895 while exploring the shell heaps and graves on the island. There were five of these instruments found together in one grave. These are also made from the tibia of a deer, but, unlike the whistle just described, the lower or smaller end of the bone is cut away to form the mouthpiece.

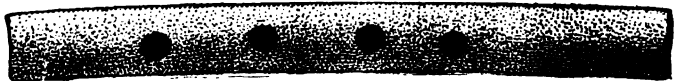


Fig. 210.

BONE WHISTLE OR FLAGEOLET.

Santa Barbara County, California.

Cat. No. 20582, U.S.N.M. $\frac{1}{2}$ natural size.

This has been carefully worked and smoothed all around. The side or vent hole is about an inch from the end. Small pieces of gum forming the air passage still adhere to the inside of the tube. There are no finger holes, and consequently only one tone could be produced. On the outside are traces of asphaltum, evidently used to hold in place a wrapping of some kind, and near the larger end an ornament made from a piece of iridescent *Halotis* shell is held in place by the same material. The instruments found by Mr. Plumb are of unequal lengths, show no traces of asphaltum on the larger end as do the Schumacher specimens (fig. 209), and they were probably intended to be used singly. These were described by Prof. E. S. Holden.¹

In the graves on the island of Santa Catalina, Schumacher² found

¹ Popular Science Monthly, March, 1896.

² Report upon U. S. Geographical Surveys West of the One Hundredth Meridian, VII, Archaeology, p. 237.

sight double whistles or pipes, and on San Clemente, one, which is here represented as fig. 209. These were made from the tibia of a deer, joined together and held in position by having the lower ends inserted in a mass of asphaltum and then wound with bark, which in its turn was covered with asphaltum and extending nearly the entire length of the instrument. At the distance of an inch and a quarter from the open end were vent holes, one in each bone, with a mass or bridge of asphaltum placed inside in such positions and of such size as to leave but a small space for air. The open ends of both instruments were inserted in the mouth, and it was doubtless blown flageolet fashion.

A bone fife or flageolet is represented by fig. 210, which, being without mouthpiece, is simply a bone cylinder as represented, with four finger holes, and was made from the femur of a bird. Contrary to the foregoing specimen (fig. 209), it is very white and highly polished, with a uniform thickness. It was obtained by Mr. Schumacher from a grave on Santa Cruz Island.

Fig. 211 represents an instrument made from the ulna of the brown pelican. It is without mouthpiece, but has four small finger holes. It is from San Miguel Island, California, and was collected by Mr. W. H. Dall. The ends are so much weathered and broken that it is impossible to say of what the whistling apparatus consisted. There are, however, in the Ethnological Museum collection bone flageolets from Costa Rica (see fig. 273), identical in shape with the one just mentioned and giving a series of musical tones. In these the mouthpiece is at the larger end, which is filled with gum or asphaltum, leaving an air passage which connects with a vent hole about $1\frac{1}{4}$ inches distant. It seems probable that the California specimens were constructed in the same way, but they have become fragile by age and other causes, and in only one or two instances can any tone be produced.

The following list will give the additional instruments in the United States National Museum, the catalogue numbers, with the kind of instrument and the locality where found, collected principally by Messrs. Schumacher and Bowers:

BONE WHISTLE OR FLAGEOLET.
San Miguel Island, California.
Cat. No. 14851, U.S.N.M. *f. natural size.*

FIG. 211.



Whistles without lateral opening.

Cat. No.	Locality.	Num- ber.
26290	Santa Cruz Island, California.....	1
29650	San Miguel Island, California.....	1
14994	.....do.....	1
29667	.....do.....	1

Whistles with lateral opening.

15521	Mare Island, California.....	1
18162	Santa Cruz Island, California.....	1
18163	.....do.....	1
18164	.....do.....	1
20532	Santa Barbara Island, California.....	1
21775	San Luis Obispo, California.....	1
18201	Santa Cruz Island, California.....	1
26408	San Miguel Island, California.....	1
29675	.....do.....	2
18323	Santa Cruz Island, California.....	5
62664	La Patera, Santa Barbara County, California.....	1

Whistles or flageolets with four finger holes.

18336	Santa Cruz Island, California.....	1
20532a	Santa Barbara Island, California.....	1
14987	San Miguel Island, California.....	1

Undetermined.

26272	Santa Cruz Island, California.....	1
26273	.....do.....	1
26274	.....do.....	1
26275	.....do (broken).....	1
26276	.....do (fragment).....	1
26277	.....do (broken, unfinished).....	1
26278	.....do.....	1
26279	.....do.....	1
26281	.....do.....	1
20282	.....do (ornamented).....	1
29658	San Miguel Island, California.....	1
29657	.....do.....	1
29659	.....do.....	1
29649	.....do.....	1
29644	.....do.....	1

Fig. 212 represents a double flute from the McCloud River Reservation, Shasta County, California (received from Livingstone Stone). The tubes are of soft wood, resembling elder stalk, with bark and pith removed. There are four finger holes in each tube, made with a burning iron. There is no sign of the use of asphaltum, nor is there any

mouthpiece. Both tubes are open from end to end, and it is suggested that they have been blown upon not as a flageolet, but across the hole in the open end of the tube instead of across the lateral hole in the side. What use the four finger holes were is quite undetermined, for, while they are not too great in number, they are so far apart that no person can cover them all at the same time.

Drums and rattles.—There seems to have been among the California aborigines, whether ancient or modern, an almost total absence of these instruments or any musical instruments of percussion.

Capt. George M. Wheeler, United States Engineer in charge of the geographical survey west of the one hundredth meridian, and principally on the coast of southern California, made, or caused to be made, extensive archaeological investigations into the prehistoric occupation on the Pacific coast of southern California, especially among the islands. This expedition had the aid of persons at that time the best qualified in the United States to make such investigations. The result was published in Volume VII of the series, and is entitled "Archæology." In the introduction (p. 26), is found the following:

In the way of musical entertainments it is evident that the Californians were limited to very primitive instruments, the only kinds that have been found in the graves consisting of whistles made of bones of animals. Some of these, however, exhibit considerable ingenuity, and it may be that they were played upon with skill.

This statement is verified by Mr. W. H. Dall, verbally, whose opinion and observation is entitled to great weight because he had, prior to that time, made elaborate and extensive ethnologic investigations among the aborigines of Alaska, prehistoric and modern, where he had found such an extensive and almost universal use of the drum.

The United States National Museum possesses neither drums nor rattles from the southern coast of California, and as for rattles, while they are rare, those which are found belong to modern Indians far in the interior. They are also peculiar in their construction and quite different from those found elsewhere among the aborigines.

Fig. 213 represents an object of pottery, possibly a rattle, from

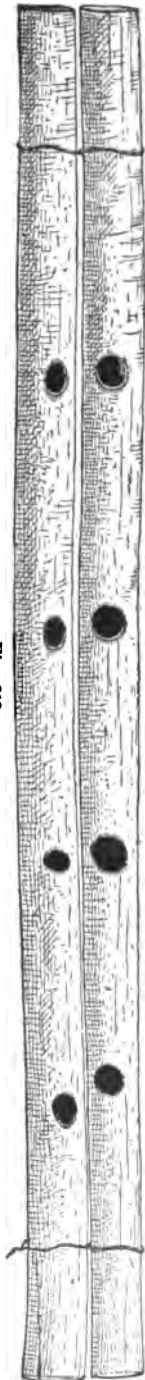


Fig. 212.

DOUBLE WOODEN FLUTE.

McCloud River Reservation, Shasta County, California.
Cat. No. 13416, U.S.N.M. ♀ natural size.

San Diego, California, collected by Mr. Edward Palmer. The finder reports it as a doll and not an idol nor a rattle. The lower part is spherical; a small orifice is shown in front; through this have been pushed two little pebbles a quarter of an inch in diameter. Whether the insertion of these pebbles was intentional or accidental, we have no means of knowing, nor is it known whether their insertion changed the character of the instrument in the intention of the maker from a

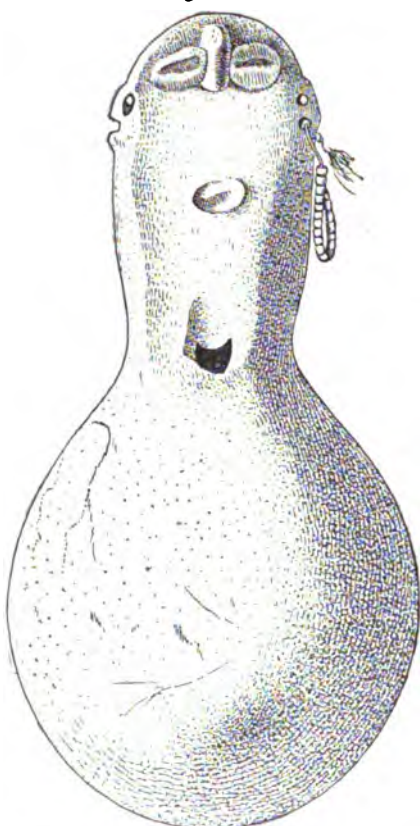


Fig. 213.

POTTERY RATTLE (OR DOLL ?).

San Diego, California.

Cat. No. 19739, U.S.N.M. $\frac{3}{4}$ natural size.

doll to a musical instrument. The walls of the sphere are solid and quite thick, and not calculated to give off much sound, and, while the rattling of the two pebbles can be heard, yet they sound but faintly and can be heard only a short distance. The more it is examined, the less certain is the conclusion that it was ever intended as a rattle. Another item is that the protuberances representing ears have been pierced and, though the right ear has been pulled out and the string lost, yet in the left ear the hole is perfect and contains a string of white and green glass beads alternated. This would seem almost decisive in favor of the object having been a doll and not a rattle, though it may have been used for both.

Specimen, Cat. No. 165685 (U.S. N.M.) from the Pomo Indians, Mendocino County, California, is a rattle made of the scrotum of an animal, cut open and sewed together, inclosing pebbles or shot.

NORTH AMERICAN INDIANS, EAST OF THE ROCKY MOUNTAINS.

Fig. 214 represents a musical instrument of the flute or flageolet type. It is blown from the end, but is without a mouthpiece; whether always so or because of its loss is not known. It is made from the humerus of a swan, is 10 inches in length; the sound or vent hole is lateral and $2\frac{1}{4}$ inches from the upper end. The natural hollow of the bone forms the bore of the instrument, and is nearly filled with asphaltum at the vent hole, apparently for the purpose of reducing its size and giving the necessary vibrations when blown through the upper end. This asphaltum has so far deteriorated or become degraded as that the instrument will emit only an imperfect

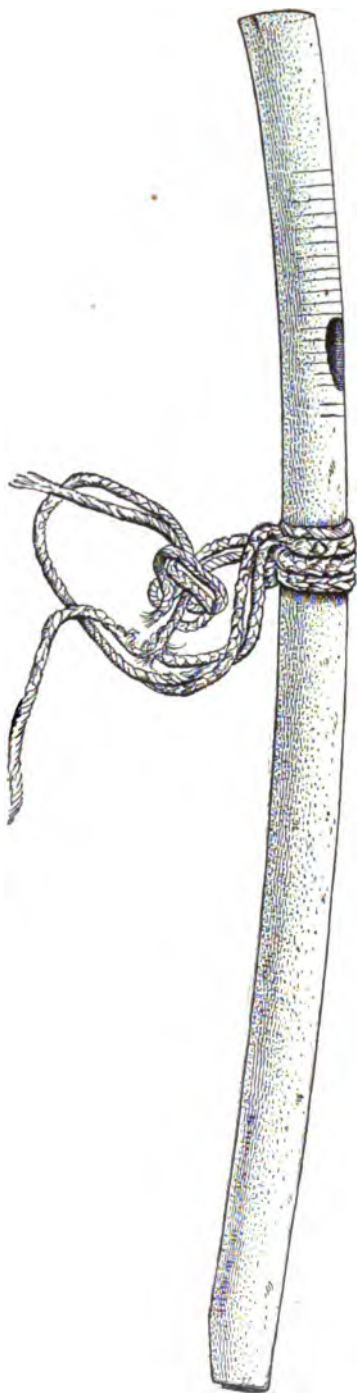


Fig. 214.
BONE WHISTLE, PORCA GRAVE (?)
Fort Randall, South Dakota.
Cat. No. 10105, U.S.N.M. $\frac{1}{16}$ natural size.

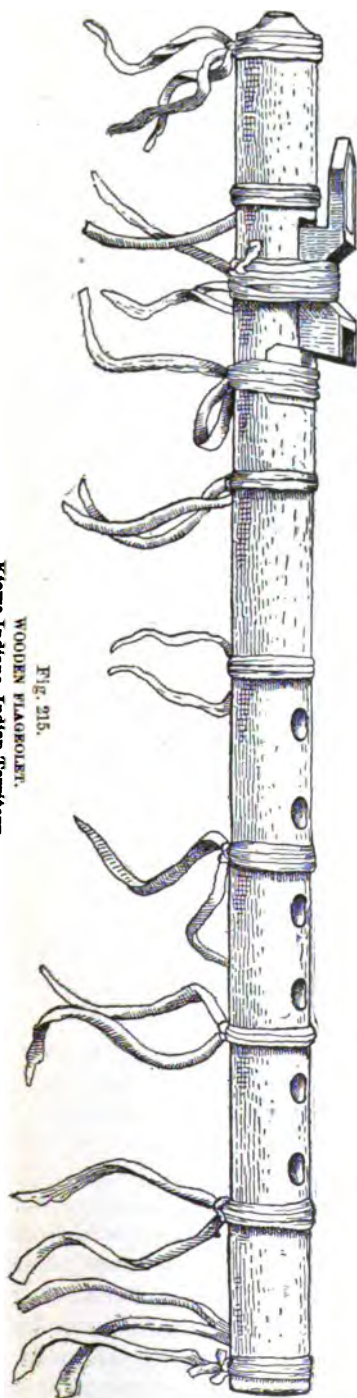


Fig. 215.
WOODEN FLAGEOLET,
Kiowa Indians, Indian Territory.
Cat. No. 10084, U.S.N.M. $\frac{1}{16}$ natural size.

note or sound when blown upon. The instrument was taken from an

Indian grave at Fort Randall, and is marked as having been collected by Asst. Surg. A. J. Comfort, U. S. A.

Arapahoes, Mandan Sioux, Yankton Sioux, Kiowas, Seminoles.—Specimen, Cat. No. 153575 (U.S. N.M.) is an Arapaho medicine man's rattle made of skin. Its length is 9 inches. Specimen, Cat. No. 7712 (U.S.N.M.) is a rattle used by a Mandan medicine man, Dakota Territory, Fort Berthold, Upper Yellowstone River, and was collected by Drs. Gray and Matthews. Specimen, Cat. No. 8354 (U.S. N.M.) is a rattle used as a neck ornament by the Sioux Indians. It is a skeleton of a tortoise which has become mummified and has head and claws still attached. It was suspended from the neck so as to come far down on the breast, and around the lower end are bored eight small holes from which are suspended sixteen little metal strips and four diminutive copper bells, all of which

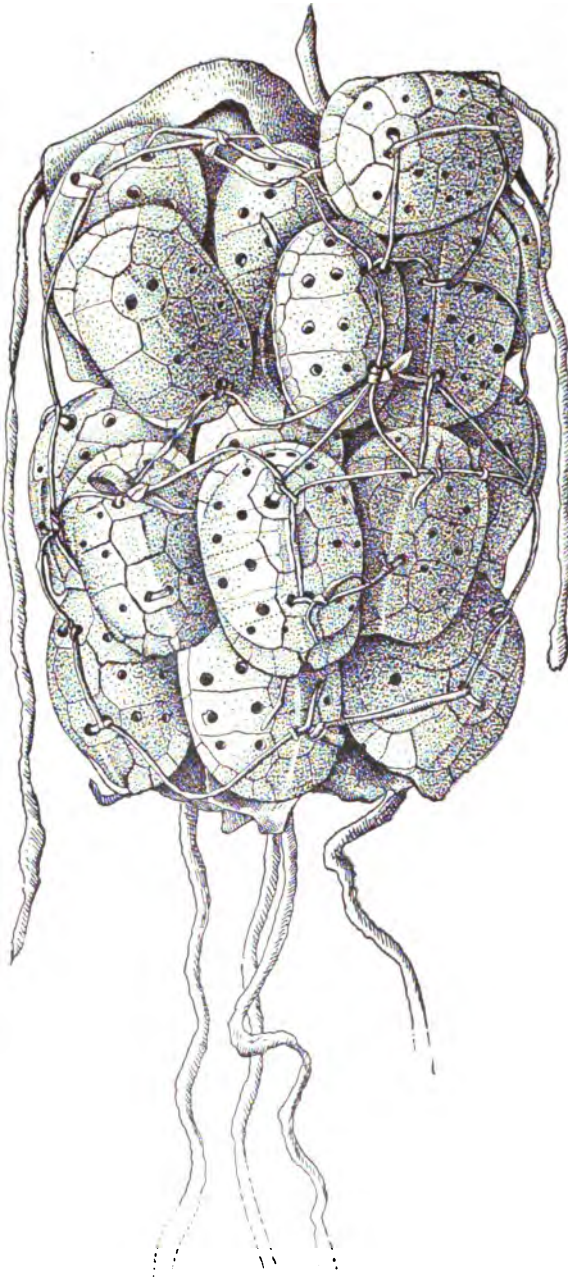


Fig. 216.

DANCE RATTLE OF TORTOISE SHELLS.

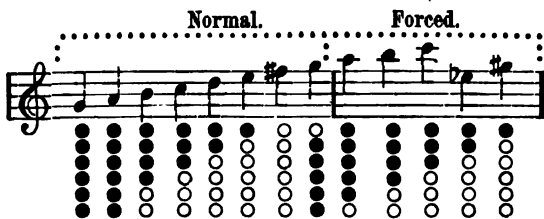
Lake Okechobee, Florida.

Cat. No. 15543, U.S.N.M. $\frac{2}{3}$ natural size.

serve to make a rattling, jingling noise during the motion of the individual, presumably while in the dance.

Specimen, Cat. No. 8845 (U.S.N.M.) is a dance rattle of the Yankton Sioux. It is a stick covered with tanned buckskin, to which are attached, by leather thongs, a number of hoof tips. The end of the leather is like a sack, ornamented with bead designs and two eagle feathers. Its length, not including sack, is 17 inches.

Fig. 215 represents a flageolet of the Kiowa Indians. It is represented as having been purchased by Captain Pratt, in 1888, for the sum of \$1.65. It is of cedar, has been made in halves so as to work out the interior, and is then gummed, put together, and bound tightly by ten different strands of buckskin, which serve to keep it in place. They are each wound three or four times around and tied in hard knots, except that over the vent hole, which forms a bowknot, all the ends being allowed to hang, as shown in the figure. Its length is 18 inches; its diameter, interior $\frac{3}{8}$ inch, exterior $1\frac{1}{8}$ inches. It has six finger holes put about equal distances apart and in the same relation to each other as in the white man's ordinary flageolet. The mouth hole is in the upper end and has been carved out of the solid, as represented in the figure. There is little doubt that this is a modern Indian instrument. Its scale is as follows:



The note G in the staff and the G above are a little sharp—between G and A \flat . A series of notes obtained by cross fingering were only duplicates of tones already given.

Fig. 216 represents a leg rattle of the Seminole Indians. It consists of fifteen shells of the box tortoise attached to a leather legging. The shells are perforated with small holes and filled with black seeds about $\frac{1}{16}$ inch in diameter. Its length is 14 inches and width $10\frac{1}{2}$ inches.

Dr. Daniel G. Brinton, in a paper entitled "Native American stringed musical instruments,"¹ remarks:

It is generally stated that the American Indians at the time of the discovery did not use anywhere on the continent a stringed instrument. I have found, however, four examples which seem to controvert this, and I give them in the hope that the readers in *The Antiquarian* will be able to add to their number.

He describes one as the "Apache fiddle," a small stringed instrument of one cord. The specimen is in the Museum of the University of Pennsylvania.

¹ *American Antiquarian*, January, 1897.

The resonator is a hollow reed about a foot in length, over which is stretched a strand composed of six or eight horse hairs. The strand is, at one end, wrapped around a movable crossbar, which allows it to be tightened at will. The cord is sounded by means of a bow with a horsehair string. There is some doubt whether this is a genuine aboriginal invention.

Another example is taken from Adair's History of the American Indians (p. 175), who relates that in 1746 he was among the "Mississippi-Natchee" Indians and witnessed a performance "on one of their old sacred musical instruments, * * * 5 feet long and a foot wide on the head of the board, with eight strings made out of the sinews of a large buffalo." It was played with a bow which was managed by two Indians, one at each end.

Another is the "quijongo" of Central America:

A monocord, made by fastening a wooden bow with a stretched cord over the mouth of a gourd or jar, which serves as a resonator. The bow is usually a hollow reed about 5 feet long, and the resonator is attached at one-third the distance from one end. The string is then bent down and fastened to the mouth of the jar. The notes are produced by striking the two sections of the string with a light stick, and at the same time the opening of the jar is more or less closed by the palm of the hand, thus producing a variety in the notes.

His fourth is a specimen from the Metropolitan Museum, New York, and is described as a reed about 5 feet long, with a jar fastened at the middle point, above which is a bridge. To this are attached four strings of different lengths. The specimen is labeled as from the Upper Purus River, Brazil, "Apurman Indians." But Dr. Brinton adds:

No such tribe and no such instrument are mentioned by Martius, Markham, Ehrenreich, Von den Steinen, or Polak, so I can add nothing to the information on the label.

Very nearly all interest in the foregoing as aboriginal stringed musical instruments is taken away by Dr. Brinton's last paragraph:

It is possible that in all these cases the instruments were borrowed with modifications from the whites or negroes; but there is sufficient probability that they were aboriginal American inventions to make their further study desirable. The stringed instrument sometimes found in Central America, made by stretching cords over the concave carapace of an armadillo, or turtle, must be modern, as it has no native name in either Maya or Nahuatl.

Professor Mason is sure that the aboriginal tribes of America had no stringed musical instrument whatever.

Rowbotham¹ says that the North American Indians were able to record their music by cutting notches in sticks, and he cites Schoolcraft, I, Chap. VI. He figures one of these sticks, declaring that the rise and fall of the tone necessary to produce the melody is indicated by the position of the notches, that a rising slope indicated a raise of the tone, this as they proceeded from left to right; and that a declivity of the notch or stick indicated a lowering of the tone, and that the abruptness in each case of the slope indicated the rapidity with which the rise or fall should be made. He also cites Kohl's Wanderings Around Lake Superior, pages 287-290, and Tylor's History of Mankind, page 157.

¹ History of Music, III, p. 198.

MISSOURI (MOUNDS).

Whistles (limonite concretions).—Certain whistles have been found, principally in Missouri, which belong to the epoch of the Mound Builders or are surely pre-Columbian.

They are limonite concretions which have been opened at one end, presumably where the crust is thinnest, the clay nucleus has been removed so as to leave a hollow interior and the opened end of the shell ground to a beveled edge, moderately sharp and thin, so that being blown against it produces a sound. The United States National Museum possesses a series of four of these.

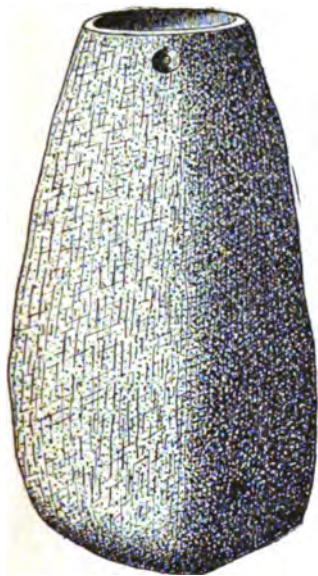


Fig. 217.

WHISTLE, LIMONITE CONCRETION.

Blackwater Creek, Saline County, Missouri.

Douglas collection, Museum of Natural History, New York. Natural size.



Fig. 218.

WHISTLE, LIMONITE CONCRETION.

Blackwater Creek, Saline County, Missouri.

Douglas collection, Museum of Natural History, New York. Natural size.



A series of five belongs to the collection of Mr. A. E. Douglas, Metropolitan Museum of Natural History, Central Park, New York City. Figs. 217, 218, and 219 represent three of these. The small hole on one side near the upper end may have served for suspension as in some specimens it shows signs of wear. They are all from Blackwater Creek,



Fig. 219.

WHISTLE, LIMONITE CONCRETION.

Blackwater Creek, Saline County, Missouri.

Douglas collection, Museum of Natural History, New York. Natural size.



Fig. 220.

WHISTLE, LIMONITE CONCRETION.

Chariton County, Missouri.

Cat. No. 69087, U.S.N.M. Natural size.

Saline County, Missouri, and their musical tones or notes are, respectively, as follows:



The specimens in the National Museum received from Mr. C. J. Turner are identical with the foregoing, with the exception of one which is

represented in fig. 220. Its form is somewhat like a flattened globe and its note is here given:



The tones emitted by the remaining specimens (not figured) are as follows:

Specimen, Cat. No. 62034 (U.S.N.M.), Chariton County, Missouri.



Specimen, Cat. No. 62035 (U.S.N.M.), Chariton County, Missouri:



Specimen, Cat. No. 62036 (U.S.N.M.), Chariton County, Missouri:



Thruston¹ figures a stone whistle of more elaborate mechanism. It is here reproduced as fig. 221. His description is as follows:

We may feel assured, however, that the aboriginal Tennesseans were not without musical instruments. The tube or whistle of dark-gray steatite, 11½ inches long,



Fig. 221.

STONE WHISTLE.

Warren County, middle Tennessee.

Thruston, *Antiquities of Tennessee*, p. 283, fig. 190.

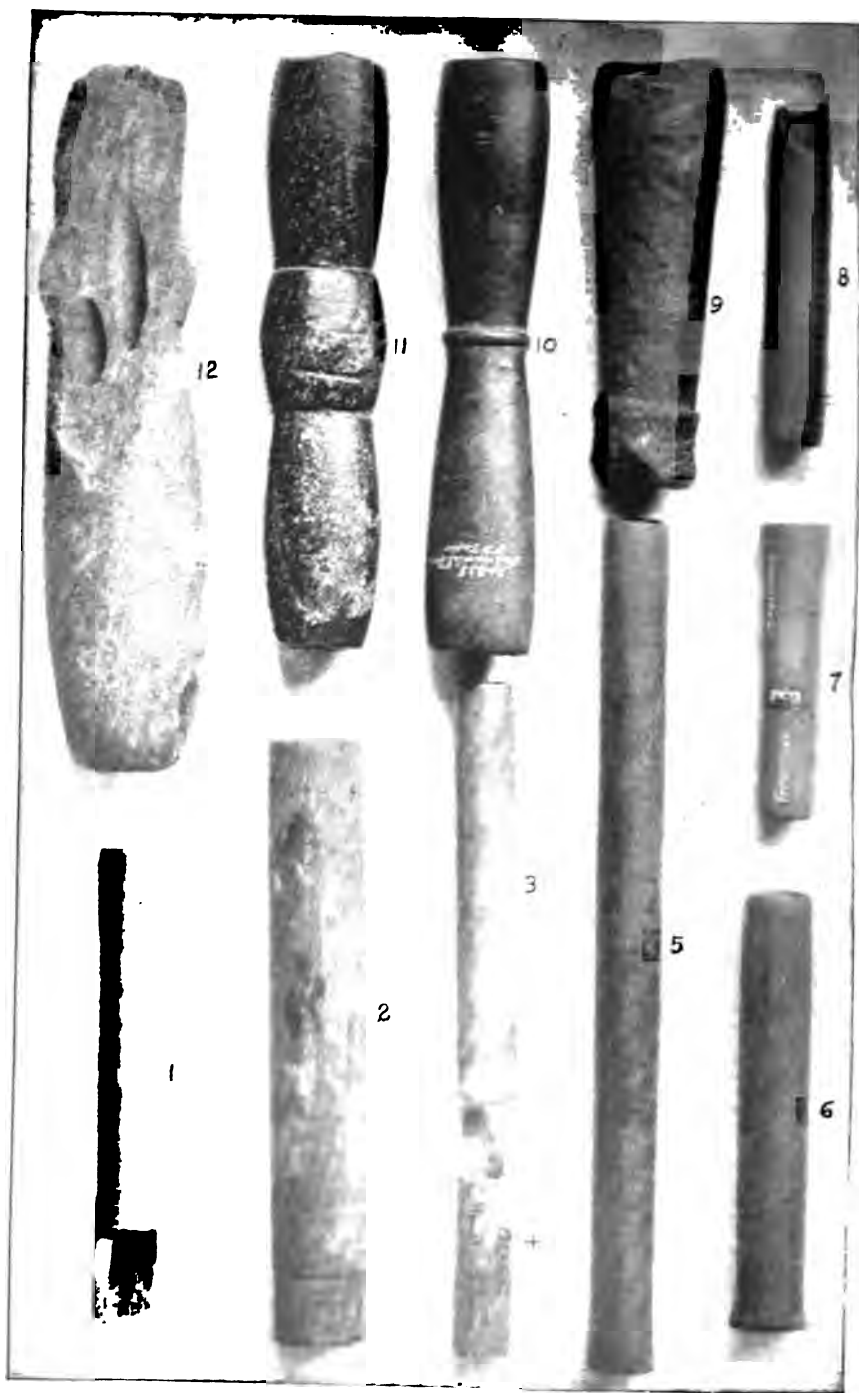
represented in fig. 190, never fails to respond in ample volume to a good pair of lungs, although not always in harmonious notes. The form of this interesting tube clearly indicates its use. It was plowed up in a field in Pleasant Cove, Warren County (Middle Tennessee), by Mr. John Blanks, and presented by him to

its present owner, Dr. Thomas Black, of McMinnville, Tennessee, who kindly loaned it to the writer. The sectional view shows its interior construction, and the artistic and mechanical skill with which it is made. This fine relic appears to be unique.

VIRGINIA, OHIO, TENNESSEE, ETC.

Stone tubes, possible musical instruments.—In the National Museum are a number of stone tubes of cylindrical and other forms, of different lengths. The smaller ones, often only a few inches long, have been thought to be ornaments. A variety of uses are ascribed to the

¹ *Antiquities of Tennessee*, p. 283.



STONE TUBES—MUSICAL INSTRUMENTS (?).

U. S. National Museum. $\frac{1}{2}$ natural size.

EXPLANATION OF PLATE 74.

- Fig. 1. From Woodstock, Vermont.
(Cat. No. 10915, U. S. N. M.)
- Fig. 2. From Dos Pueblos, California.
(Cat. No. 62438, U. S. N. M.)
- Fig. 3. From Rockingham, Virginia.
(Cat. No. 42674, U. S. N. M.)
- Fig. 4. From Virginia.
(Cat. No. 6088, U. S. N. M.)
- Fig. 5. From Swanton, Vermont.
(Cat. No. 30033, U. S. N. M.)
- Fig. 6. From Swanton, Vermont.
(Cat. No. 30034, U. S. N. M.)
- Fig. 7. From Tennessee.
(Cat. No. 6812, U. S. N. M.)
- Fig. 8. From Tennessee.
(Cat. No. 12271, U. S. N. M.)
- Fig. 9. From Georgia.
(Cat. No. 31584, U. S. N. M.)
- Fig. 10. From Tennessee.
(Cat. No. 34835, U. S. N. M.)
- Fig. 11. From Tennessee.
(Cat. No. 27772, U. S. N. M.)
- Fig. 12. From Etowah Mound, Georgia.
(Cat. No. 170858, U. S. N. M.)

larger objects, the most plausible being that by the medicine man for the pretended cure of disease. Their use for smoking or as whistles or calls has also been suggested. By proper manipulation they will emit a sound which can be heard for quite a distance, and it is possible they were used for that purpose. This remark applies to the tubes which have cylindrical holes drilled almost the entire length and then finished with one of smaller diameter (Nos. 1 to 8, plate 74), and also to the class which have biconical holes, having been drilled from both ends (Nos. 9 to 11, plate 74), and then scooped out with a tool so that the hole conforms somewhat to the outline and is smallest in the center. No. 12 shows one of this class broken before the enlarging process had been begun. These objects, if musical instruments, were not whistles but trumpets, for the sound can only be made by blowing in the same manner as are instruments of that class. The materials are usually soapstone, banded slate, and chlorite, although specimens of sandstone are not wanting.

Cylindrical tubes.

Catalogue number. U.S.N.M.	Locality.	Material.
6088	Virginia	Indurated clay.
6812	Ohio	Do.
12271	Tennessee	Do.
42674	Mound, Rockingham County, Virginia.....	Do.
10910	Woodstock, Vermont.....	Do.
30034	Swanton, Vermont (cast).....	Originals, compact sandstone.
30033	.....do	Do.
30035	.....do	Do.
62438	Dos Pueblos, California.....	Indurated clay.

Tubes encircled in the middle with raised ring and expanding toward the ends (hourglass).

Catalogue number.	Locality.	Material.
34835	Scarboro, Anderson County, East Tennessee.....	Chlorite.
27772	Mound, Grassy Cove, Tennessee.....	Steatite.
58531	Tioga County, New York.....	Do. (?)
170658	Etowah Mound, Georgia.....	Do.

It is not at all certain that these are musical instruments, or were ever used as such, or if used it was other than sporadic or accidental. They are figured among the musical instruments for several reasons: (1) While the various uses have been suggested or surmised, no definite use has ever been discovered, and if not musical instruments, they are to be classed as unknown, or, as Dr. Rau says, enigmas; (2) they can be made to produce a sound by being blown trumpet fashion; (3) they have been claimed or classed as trumpets or horns for the making of signals or calls, as the trumpet calls of an army or encampment.

General Thruston,¹ speaking of stone tubes of hourglass form, quotes the following from Judge Haywood's History of Tennessee:

When the stone trumpet is blown through, it makes a sound that can be heard, perhaps, 2 miles, and that probably it was used for similar purposes to those for which the trumpets of the Israelites were used, namely, principally to convene assemblies and to regulate the movements of an army.

General Thruston's experience with these tubes does not seem to have been satisfactory, for he adds:

We have exhausted our blowing powers upon two similar "stone trumpets" in our collection without eliciting any satisfactory response in the way of music or noise, and we scarcely think it possible that these tubular objects could have been designed "for martial music," as stated.

No expression of opinion is here made as to the correctness of these claims, but we have not ignored or rejected them. To do so would be to decide the question adversely and cut off further argument. It is deemed wiser to insert the figures of these objects, calling attention to their claims as musical instruments, to the possible end that future investigators may discover something concerning their use and thus be enabled to settle the question. So far as the writer can discover in the published descriptions of these objects, their use as musical instruments is rarely advanced.

CLIFF DWELLERS.

Mr. W. H. Holmes,² in speaking of the pottery of the ancient Pueblos, says:

The ancient people had not devoted their ceramic art to trivial uses; there are no toys, no rattles, and no grotesque figures.

This remark would seem to apply equally as well to the Cliff Dwellers; but that musical instruments made of other materials were not unknown to these people is evidenced by the fact that among the objects mentioned by the late G. Nordenskiöld as coming from the cliff ruins of the Mesa Verde, in southwestern Colorado, are fragments of a wooden flute and a small bone pierced with



Fig. 222.

FRAGMENTS OF
WOODEN FLUTE.

Colorado.

Nordenskiöld, *Cliff Dwellers of the Mesa Verde*, p. 101, fig. 64.



Fig. 223.

BONE WHISTLE (?).

Colorado.

Nordenskiöld, *Cliff Dwellers of the Mesa Verde*, description of plate XLI.

¹Antiquities of Tennessee, p. 282.

²Pottery of the Ancient Pueblos, Fourth Annual Report of the Bureau of Ethnology, 1882-83, p. 272.

a lateral hole and possibly used as a whistle. Speaking of these two objects, he says:¹

Among the wooden objects, some fragments of a flute found in Spring House should also be mentioned. [Here reproduced as fig. 222.] The flute was made of a bough. Its diameter was 2.5 centimeters. The longest fragment measured 45 centimeters and was pierced with three holes. In a smaller fragment, which could not be fitted together with the rest, was a trace of a fourth hole.

Of the bone object he says (description of plate XLI):

The above figure [here represented in fig. 223] shows a bone implement pierced with a little hole, and perhaps used as a whistle.

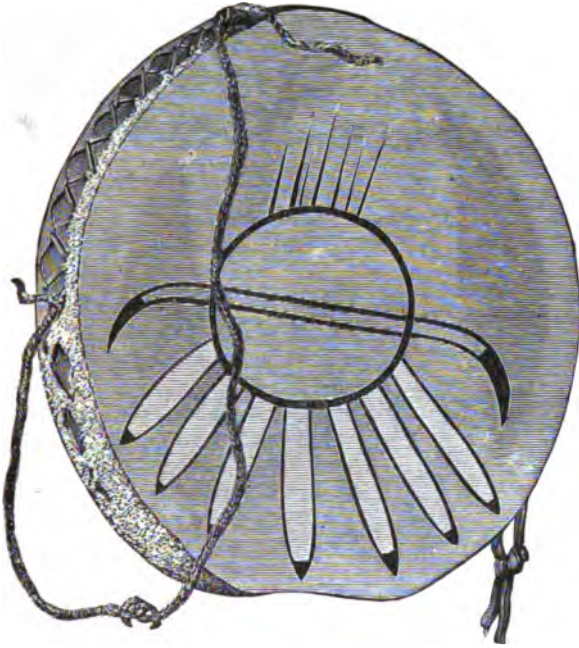


Fig. 224.

DRUM.

Pueblo Indians, New Mexico.

Cat. No. 41176, U.S.N.M. $\frac{1}{2}$ natural size.

There seems to be no reason why the use ascribed to these objects by Professor Nordenskiöld should not be accepted. A people with an art culture so highly developed in other directions might easily have invented and used musical instruments.

PUEBLO INDIANS—(ARIZONA AND NEW MEXICO).

The following descriptions of musical instruments from the Pueblos are intended merely for comparison, or for showing certain resemblances of form between them and objects of the same class from other

¹ The Cliff Dwellers of the Mesa Verde, p. 101, fig. 64.

localities. It is not claimed that they are all prehistoric, although some of them are undoubtedly ancient. Mr. James Stevenson, in his illustrated catalogue of the collections obtained from the Pueblos, says:¹



Fig. 225.
DANCE RATTLE.
Wolpi, Arizona.
Cat. No. 49042, U.S.N.M.
 $\frac{1}{2}$ natural size.

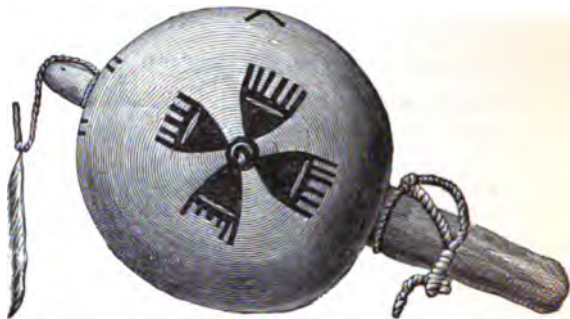


Fig. 226.
DANCE RATTLE.
Wolpi, Arizona.
Cat. No. 41862, U.S.N.M. $\frac{1}{2}$ natural size.

Quite a number of articles of this group may perhaps be properly classed as "ancient," and were obtained more or less uninjured.

And also (pp. 335, 336) that the

ornaments and musical instruments employed in dances and religious ceremonies do not differ much among the Pueblo Indians, the principal ones being the drum, rattles made from gourds, notched sticks, a kind of flute, and a turtle-shell rattle.

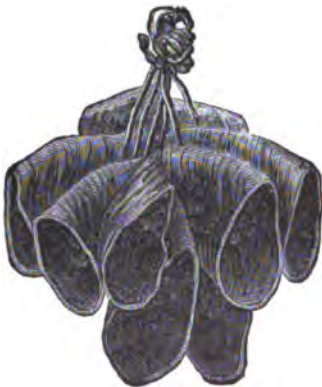


Fig. 227.
RATTLE MADE FROM OX HOOF.
Wolpi, Arizona.
Cat. No. 41855, U.S.N.M. $\frac{1}{2}$ natural size.

Drums.—Fig. 224 represents one of these instruments. Mr. Stevenson's description (p. 398, fig. 581) is as follows:

A flat drum made by stretching goat hide over a wide hoop and tightened by lacing crosswise around the edge with a cord of the same material. One side is plain, the other is decorated with a figure which is not interpreted. This specimen is from Shinumo, but it does not differ from those used by many of the other tribes.

A large drum (*Pur-pi-shuk-pi-po-ya*) Cat. No. 128922 (U.S.N.M.) is of more primitive construction from the Hopi Indians of Arizona. The shell is made

from an irregular shaped section of a hollow log 15 $\frac{3}{4}$ inches long or high and 18 inches in largest diameter. Two rawhides are stretched over the ends without hoops to make the heads, and are laced together with a strip of the same material.

¹ Second Annual Report of the Bureau of Ethnology, 1880-81, p. 319.

Rattles.—Fig. 225 represents a dance rattle from Wolpi, made from a small gourd, embellished in colors of black, red, and white. The gourd is perforated at each end, through which a stick is passed for a handle. Swastikas are painted on two sides.¹

A primitive form of rattle (Tohi-mo Mu-to-pa), Cat. No. 94006 (U.S.N.M.), is from Zuñi, New Mexico. It is the shell of a scallop or summer squash dried with the seed inside, which produce the sound. Fig. 226 represents a painted gourd rattle from Wolpi, Arizona, used in dances. It is perforated for the insertion of a wooden handle.

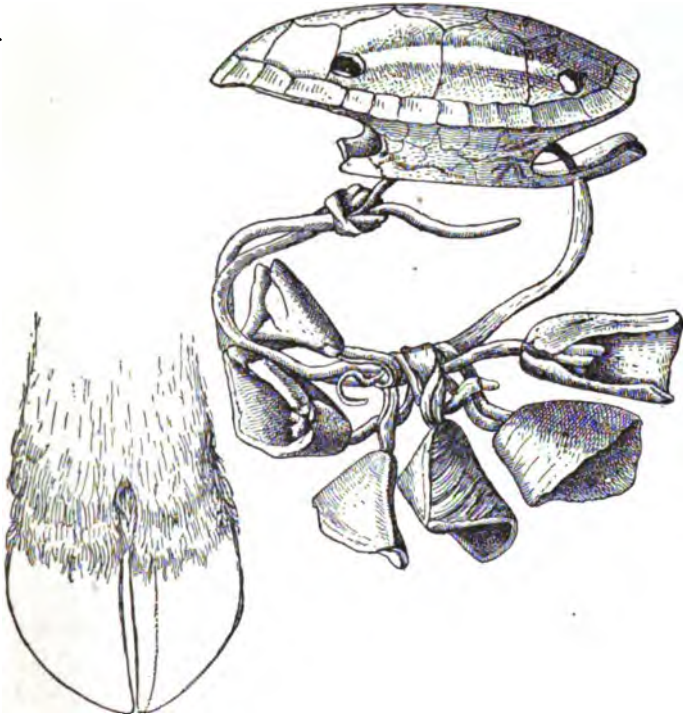


Fig. 228.

DANCE RATTLE OF TORTOISE SHELL AND DEER HOOFS.

Silla, New Mexico.

Cat. No. 47324, U.S.N.M.

A rattle made of leather in the form of a bag, inclosing pebbles, Cat. No. 47819 (U.S.N.M.), is from Silla, New Mexico. It is ornamented with feathers.

Fig. 227 represents a bunch of ox hoofs or toes, used as a rattle in dances. The objects are frequently attached to the edge of turtle shells, thereby increasing the sound. From Wolpi, Arizona.

In fig. 228 is shown a rattle made from a tortoise shell with deer hoofs attached by buckskin thongs. It is from Silla, New Mexico.

¹ Wilson, *The Swastika*, p. 896, fig. 256.

Fig. 229 represents another rattle of this class from Zuñi, New Mexico. Mr. Stevenson's description (p. 373) is as follows:



Fig. 229.

DANCE RATTLE.

Zuñi, New Mexico.

Cat. No. 41853, U.S.N.M. $\frac{1}{2}$ natural size.

Specimen of a rattle or musical instrument made from the shell of a turtle, which is highly esteemed by the Pueblo tribes. The flesh of the turtle is carefully removed from the shell, leaving it hollow. To the edges of the breastplate are attached the toes of goats or sheep. These toes, coming in contact with the hollow shell, produce a peculiar sound, in keeping with the sound caused by the gourd rattles used in the same ceremony. The rattle is fastened to the rear of the right leg near the knee when employed in the dances.

Fig. 230 represents a so-called musical instrument from Hopi, Arizona. It is a stick 18 $\frac{1}{2}$ inches long, with coarse notches on one side, across which the scapula of a deer or other animal is rubbed to produce the sound.

Wind instruments.—

The wind instruments from the Pueblo Indians here mentioned are of two classes: (1) Direct flutes or hollow tubes of wood, blown across one end; (2) instruments which have a mouthpiece, made on the same principle as the modern flageolet.

Specimen, Cat. No. 69192 (U.S.N.M.) is one of the first class (*Le-na*). It is a hollow cylinder of wood with five finger holes, three in one group and two in the other. One end of the tube is beveled from the inside, making a sharp edge, against which the air is forced when blown. From Hopi, Arizona. Length, 27 $\frac{1}{2}$ inches; diameter, 1 $\frac{1}{2}$ inches.

A sacred flute (*Shoh-Koonne*), Cat. No. 69312 (U.S.N.M.), is from Zuñi, New Mexico, and is blown in the same manner as the preceding. It is made from a slightly tapering reed, and has four finger holes arranged in pairs widely separated. On the lower end is attached a flaring rim made from a piece of gourd, upon which are painted designs in bright colors. Length, 26 inches; diameter, $\frac{7}{8}$ inch at smaller end.

An instrument of the second class (flageolet) is shown in fig. 231. It is made from a hollow reed or cane, and has four finger holes. A piece of wood flattened on one side for an air passage



Fig. 230.

NOTCHED STICK (*Truh-kun-pi*).

Arizona.

Cat. No. 41987, U.S.N.M.

$\frac{1}{2}$ natural size.

is inserted in the bore and forms the mouthpiece. To the lower end is attached a flaring rim made of a piece of gourd gayly colored. The mouthpiece is somewhat mutilated, making it impossible to obtain the scale of the instrument. It is from Zuñi, New Mexico. Length, 13 inches; diameter, 1 inch.

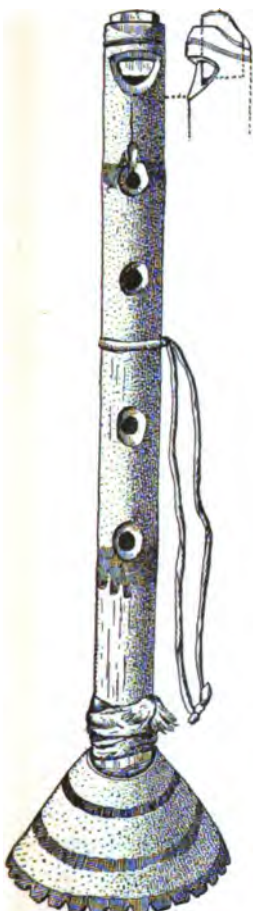


Fig. 231.

FLAGEOLET.

Zuñi, New Mexico.

Cat. No. 96479, U.S.N.M.

Fig. 232 is an instrument made of pottery, lately received by the National Museum from Mr. H. D. Thompson, of Moline, Illinois. Its remarkable similarity to specimens from Central and South America was deemed of sufficient importance to justify a description in this paper. According to Mr. Thompson, it was found several feet below the surface in the Mississippi River drift while excavating for a factory foundation. It is the only specimen of its kind found in the eastern or central United States that has thus far come to our notice. Its shape is that of an animal head (somewhat cat-like). By referring to the sketch it will be seen that the whistling mechanism is in the mouth of the animal and the eyes served as sound or finger holes. Unfortunately the mouthpiece is broken and the original scale of the instrument can not be given. Three notes, however, were possible. Pottery whistles of bird and animal shapes are frequently found in Mexico, Central and South America, as will be seen later, and the whistling

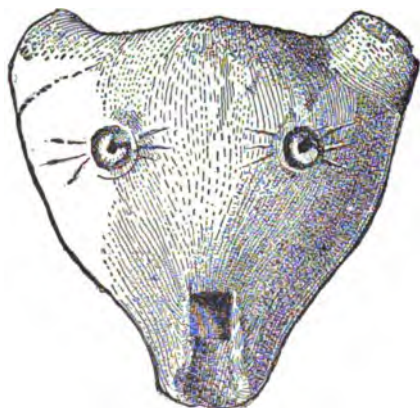


Fig. 232.

POTTERY WHISTLE.

Moline, Illinois.

Cat. No. 195246, U.S.N.M. Natural size.

apparatus in all is identical with the one here figured. Mr. Thompson (the owner) was somewhat skeptical as to the antiquity of this instrument, but the writer can only say that if it had been received from Central America its genuineness would not have been questioned, so closely does it resemble the pottery whistles from that region.

MEXICO.

Music evidently occupied a prominent place in the arts of the ancient Mexicans, for it is mentioned by the early Spanish writers in connection with war, religious ceremonies, and festivals of various kinds. The instruments described or mentioned were drums, timbals, flutes, horns, trumpets, and rattles. According to Clavigero,¹ they had no stringed instruments.

Of their use in war or military movements Bernal Diaz² relates:

We saw the enemy in the plain in our front, advancing against us, sounding their trumpets, horns, and drums.

Again he says (p. 297):

Before we arrived at our quarters and while the enemy were pursuing us, we heard their shrill timbals and the dismal sound of the great drum from the top of the great temple of the god of war, which overlooked the whole city.

Clavigero³ also mentions the use of musical instruments in war:

They began the battle (as was usual in ancient Europe and among the Romans) with a most terrible noise of warlike instruments, shouting and whistling, which struck terror to those not accustomed to hear it.

Of the religious music in charge of the priests the same author says (p. 43):

The Ometochtli was the chief composer of the hymns which were sung at festivals; * * * the Tlapixcatzin, the master of the chapel, who not only appointed the music, but superintended the singing and corrected the singers.

Of songs and dances Don Antonio de Mendoza, in a second letter⁴ to Emperor Charles V, says:

Indians accompanying their dances and songs with flutes marked at the places where fingers are to be placed. The flutes are of different sizes. The singers beat time as with us. They sing in accord with those playing.

Prescott,⁵ in speaking of the domestic manners of the Atzeca, says:

As soon as they had finished their repast the young people rose from the table to close the festivities of the day with dancing. They danced gracefully to the sound of various instruments, accompanying their movements with chants of a pleasing, though somewhat plaintive character.

¹ The History of Mexico, Trans. Charles Cullen, esq., Philadelphia, 1817, II, p. 207.

² True History of the Conquest of Mexico, Trans. Maurice Keatings, esq., London, 1800, p. 45.

³ The History of Mexico, p. 170.

⁴ Castañeda: 1540. Relation Du Voyage De Cibola, etc., Appendice, p. 295; Trans. H. Ternaux-Compares, Paris, 1838.

⁵ Conquest of Mexico, I, p. 156.

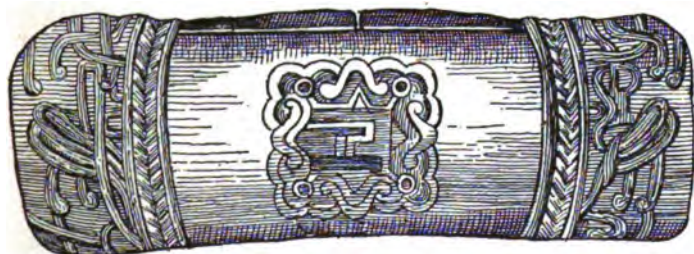
INSTRUMENTS OF PERCUSSION.

Drums (teponastli).—There is no representative of the ancient Mexican drum in the United States National Museum, and those here shown in fig. 233 *a, b*, are copied from the work of Carl Engel.¹ His description is as follows:

The teponastli of the Aztecs is generally made of a single block of very hard wood, somewhat oblong square in shape, which they hollowed, leaving at each end a solid piece about 3 or 4 inches in thickness, and at its upper side a kind of sound-



a.




b.

Fig. 233.

DRUMS.

Teponastli of the Aztecs.

Carl Engel, *Descriptive Catalogue of Musical Instruments in the Kensington Museum*, p. 77, fig. 66.

board, about a quarter of an inch in thickness. In this sound-board, if it may be called so, they made three incisions, namely, two running parallel some distance lengthwise of the drum, and a third running across from one of these to the other, just in the center.  By this means they obtained two vibrating tongues of wood, which, when beaten with a stick, produced sounds as clearly defined as those of our kettledrums. By making one of the tongues thinner than the other,

¹A *Descriptive Catalogue of the Musical Instruments in the Kensington Museum*, p. 77, fig. 66.

they insured two different sounds, the pitch of which they were enabled to regulate by shaving off more or less wood. The bottom of the drum they cut almost entirely open. The traveler M. Nebel was told by archaeologists in Mexico that these instruments always contained the interval of a third, but on examining several specimens which he saw in museums, he found some in which the two sounds stood toward each other in the relation of a fourth, while in others they constituted a fifth, in others a sixth, and in some even an octave. This is noteworthy, inasmuch as it points to a conformity with our diatonic series of intervals, excepting the seventh.

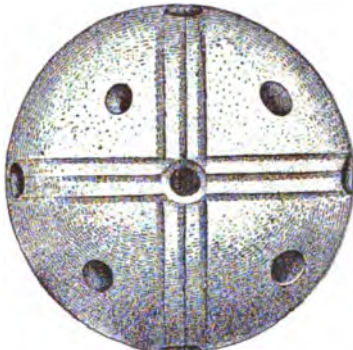


Fig. 234.
POTTERY RATTLE (*ayacachtili*).
Mexico.
Cat. No. 133206, U.S.N.M. Natural size.

miles. In some rare instances a specimen of the *teponaztli* is still preserved by the Indians in Mexico, especially among tribes who have been comparatively but little affected by intercourse with their European aggressors.

Rattles (*ayacachtili*).—The rattle appears to have occupied an important place in the ceremonies of the ancient Mexicans. In construction it was similar to the rattles commonly used by the Indians of the present day, which are round or oval in shape and usually made of a gourd, into which is inserted a wooden handle. A number of small pebbles were inclosed in the hollowed gourd.¹

Rattles made of pottery were also used, and there are in the Museum quite a number of these ancient instruments. Fig. 234 represents one of a series—the simplest form (Batchelor collection). It is round and the outer surface is ornamented with incised line decoration in panel-like designs. They are perforated with a number of holes, in most cases not placed with any particular regularity. The inside is furnished with small clay pellets, which produce the sound. Another form is shown in fig. 235, which is a double bell or rattle (Blake collection). Its shape is like two small gourds with the stems twisted together so as to form a handle. A straight slit divides the globular bodies almost in half, exposing the clay pellets which produce the sound. The painted decoration



Fig. 235.
DOUBLE BELL OR RATTLE OF
POTTERY. TLALTELOLCO.
Mexico.
Cat. No. 99109, U.S.N.M. $\frac{1}{2}$ natural size.

¹ Engel, Musical Instruments, p. 79.

is quite simple, consisting of lines and dots in black. The sound of this rattle is clear and distinct—similar to that of metallic bells.

A recent addition to the Museum (Cat. No. 196675, U.S.N.M., Phillips collection), is a gourd-shaped rattle modeled in grayish colored clay, the neck or handle representing a grotesque human head. The globular part containing clay pellets is divided in the same manner

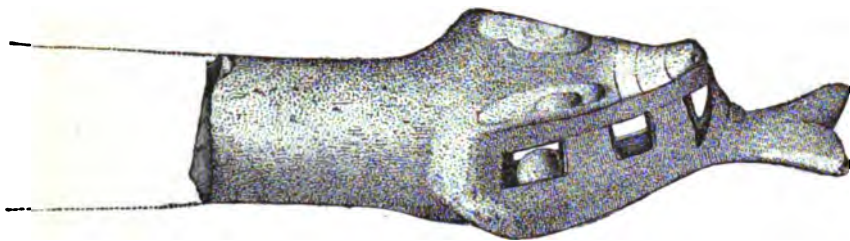


Fig. 236.

HANDLE OF INCENSE BURNER WITH RATTLE.

Hill of Tepeyac, Mexico.

Cat. No. 99082, U.S.N.M. $\frac{3}{4}$ natural size.

as the preceding (fig. 235), and in addition there are two small holes placed on opposite sides of the chamber in a line transverse to the division or slit. The clay is not well baked and the sound is rather feeble.

Additional specimens of earthenware rattles in the United States National Museum not figured are as follows:

Catalogue number.	Locality.	From whom received.
27871	Valley of Mexico.....	National Museum of Mexico.
27872	.....do	Do.
133216	Mexico	Ward Batchelor.
133217	.....do	Do.

There are a number of broken pottery instruments or objects in the United States National Museum which at first sight were thought to have been rattles. They are in the form of a slightly tapering tube, varying in length from 2 feet to 6 inches, and in diameter from $1\frac{3}{4}$ to $1\frac{1}{2}$ inches. In some of these a serpent or reptile's head containing a clay pellet is represented at one end, as shown in fig. 236. The clay is well tempered and the sound produced quite brilliant. Recent accessions from Mexico, however, furnish evidence that the above are handles of vessels used in religious ceremonies (incense burners?), the rattle probably serving an accessory purpose. Among the objects recently found by Mr. Edward Palmer in a burial cave at Dos Caminos, 25 miles east of Acapulco, were twenty-nine fragments. Ten of these are the upper part of handles with a portion of the bowl still attached, and nineteen are the lower ends terminating in heads of reptiles. One vessel has been sufficiently restored to indicate its character, and is here

introduced as fig. 237. It is in the form of an open-work bowl, the outside being ornamented with panel-like designs in low relief. A long hollow handle projects from one side, which may have terminated with a rattle, as shown in fig. 236. The similarity of these pieces or handles to the ones already possessed by the Museum was immediately recognized, and with the bowl-shaped additions lately received their identity was established. Pictographs representing certain religious ceremonies in which are priests holding like instruments are given by Chavero.¹

Of the use of incense burners by the Mexican priests, Clavigero² says:

For incense they generally make use of copal, or some other aromatic gum, . . . The censers were commonly made of clay, but they had also censers of gold.

Instruments similar to the foregoing are in the museum of the Academy of Natural Sciences in Philadelphia.

During the explorations of prehistoric ruins at Copan, Honduras, made under the direction of the Peabody Museum of American Archae-



Fig. 237.

INCENSE BURNER OF POTTERY.

Burial cave, Dos Caminos near Acapulco, Mexico.

Cat. No. 173071, U.S.N.M. $\frac{1}{2}$ natural size.

ology and Ethnology, Harvard University,³ two vessels belonging to this class were found. The report of the objects found in Tomb 6 contains the following:

A piece of pottery 13 $\frac{1}{2}$ inches long, in the form of a perforated ladle, the end of the handle representing the head of a serpent, was found near the skeleton. This, in all probability, is an incense burner.

And, again in Tomb 10:

A ladle-shaped piece of pottery similar to that found in Tomb 6.

On page 30 of the same volume, in describing the contents of Tomb 1, mention is made of a pottery whistle.

A primitive form of dance rattle still used by the Yaqui Indians of Sonora, Mexico, is outlined in fig. 238. It is made of butterfly cocoons, which are divided into halves and sewed together at one end with a double cord. Each half of the cocoons contains a grain or pebble.

¹ Chavero: *Mexico a través de los siglos*, pp. 591-635.

² *History of Mexico*, II, p. 44.

³ *Memoirs of the Peabody Museum of American Archaeology and Ethnology*, Harvard University, I, No. 1, p. 32, Prehistoric Ruins of Copan, Honduras, Preliminary Report.

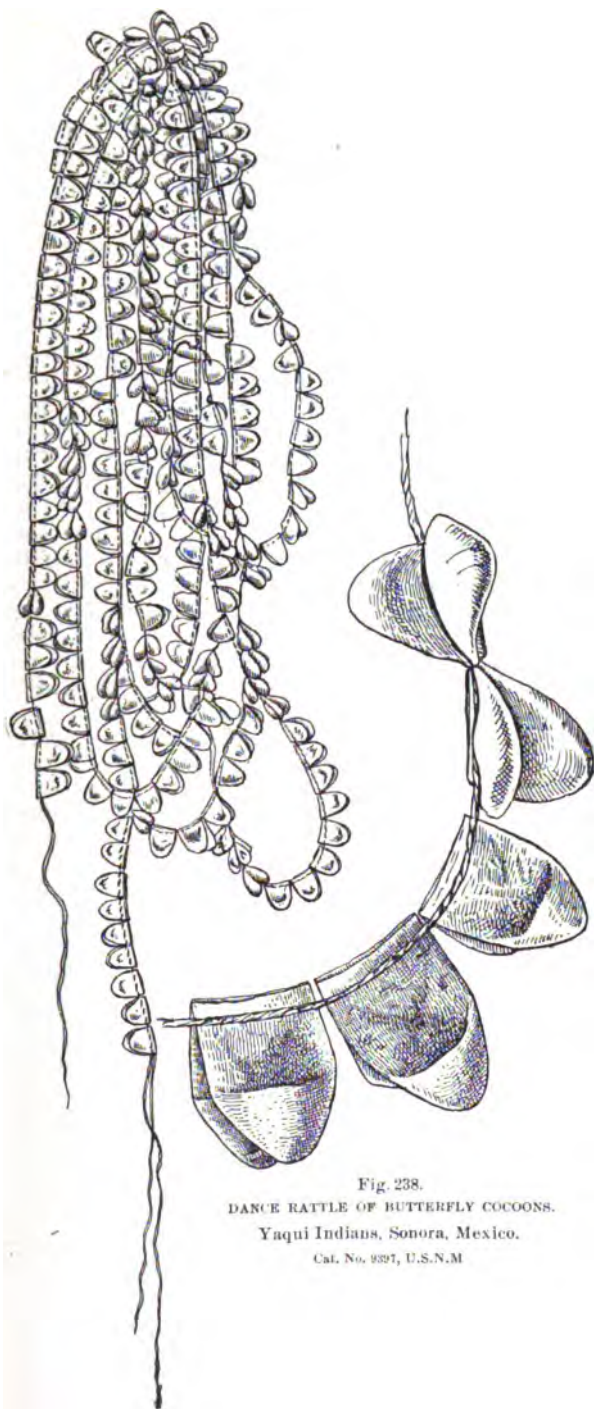


Fig. 238.
DANCE RATTLE OF BUTTERFLY COCOONS.
Yaqui Indians, Sonora, Mexico.
Cat. No. 9397, U.S.N.M

They are attached to a long cord, which is wound around the leg of the dancer.

Bells (*tzilinilli*).—The only instruments of metal in the Museum collection of Mexican antiquities are the bronze bells. (?) These appear to have been in general use by the Mexicans before the Spanish conquest, and they are often found figured in the picture writings representing the various objects which the Aztecs used to pay as tribute to their sovereigns. One of these bells is shown in fig. 239. Mr. W. H. Holmes, in "Ancient Art in the Province of Chiriqui,"¹ says:



Fig. 239.

ANCIENT COPPER OR
BRONZE BELL.

Mexico.

Cat. No. 99041, U.S.N.M.
Natural size.

A question as to the authenticity of these bells naturally arises, and it may be difficult to show to the satisfaction of the skeptical mind that any particular specimen is not of European origin or inspiration. At the same time we are not without strong evidences (historical and otherwise) that such bells were in use by the Americans before the advent of the whites. . . . The form originated, no doubt, in the rattle, at first a nutshell or a gourd; later it was modeled in clay. With the acknowledged skill of these people in the working of metals, there is no reason why the bells described should not have been manufactured independently of European aid and influence, provided the requisite metal was at hand. It should be observed that, if these early American bells were copied from or based upon Spanish originals, they would not vary greatly in type with the various sections from which they are recovered, but it is observed that marked and persistent differences do occur. The well-known Mexican bell, an example of which is here outlined in fig. 44 [our fig. 239], although of bronze, is generically distinct in form and construction.

Similar bells in the United States National Museum not figured are as follows:

Catalogue No.	Locality.	Number.	Collector.
97782	Orizaba, Mexico	7	L. H. Ayme.
99035	Mexico	1	W. W. Blake.
99036	do	1	Do.
99037	do	1	Do.
99038	do	1	Do.
99039	do	1	Do.
99040	do	1	Do.
99042	do	1	Do.
99043	Guerrero, Mexico	1	Do.
99044	Tenango del Valle, Mexico	1	Do.
133198	Mexico	1	Ward Batchelor.

¹ Sixth Annual Report of the Bureau of Ethnology, p. 51.

WIND INSTRUMENTS.

Whistles or flageolets (pottery).—The ancient instruments of the class which are here to be described form a most interesting series; not only those from Mexico, but the similar ones from Central and South America. They show in some degree the progress which the aborigines had made in the arts, and that a musical system, however crude, had been attained. The whistling mechanism in all is identical with that of the modern flageolet, and the only distinction that can be made between them is by classing the instruments which only emit one sound or note, as whistles, and those which have one or more finger holes, as flageolets. The simple form may have served only as calls or signals. The smaller instruments are mostly grotesque caricatures of the human face or figure or of animals or birds. The larger instruments are more like the modern flageolet. Fig. 240 represents one of the smaller class. The body of this is a short tube with one end closed.

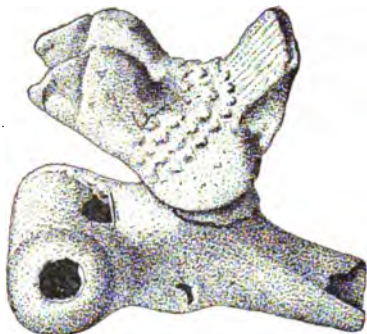


Fig. 240.

POTTERY WHISTLE, DOUBLE EAGLE.

Mexico.

Cat. No. 133913, U.S.N.M.

Natural size.

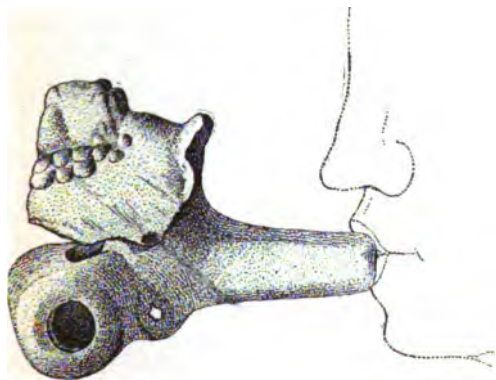


Fig. 241.

POTTERY WHISTLE, MUTILATED.

Mexico.

Cat. No. 133910, U.S.N.M.

Natural size.

A prolongation at right angles to the tube forms the mouthpiece, and on the upper part, where the two are joined, is placed a figure representing a bird with two heads. It is modeled in grayish-colored clay, unpainted. Closing the end hole will give the lower note, when opened the higher one, as seen in the accompanying scale:



Another instrument from the same locality is shown in fig. 241. It is identical in material and general shape. The ornament or figure is mutilated. Its original form was undoubtedly bird-like. The tones are here given:



Professor Kollman¹ figures and describes instruments of this and other Mexican types in a paper entitled "Flöten und Pfeifen aus Alt-Mexiko" (in the *Festschrift* published by Riemer in Berlin in commemoration of the seventieth birthday of Adolf Bastian.) These instruments form part of a series of Mexican antiquities belonging to the ethnographic collection in Basel. They were obtained in Mexico by Henri Lukas Vischer during the years 1828-1837. A translation, most kindly furnished by Mr. H. von Bayer, of Professor Kollman's description of the double-headed bird whistles, is as follows:

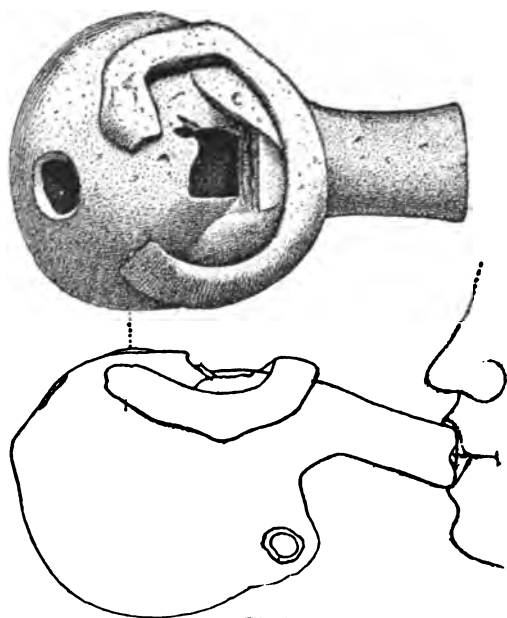


Fig. 242.

POTTERY WHISTLE, PEAR OR GOURD SHAPED.

Valley of Mexico.

Received from Museo Nacional, Mexico.

Cat. No. 27869, U.S.N.M. $\frac{1}{2}$ natural size.

On the fife (fig. 4) there is an imitation of a prairie hen (*Bonasa cupido*). Another fife of our collection shows a pair of these hens united similar to the double eagle, as shown in fig. 5. The animals are represented in a live attitude; the wings are spread, the head and tail held up, as if preparing to rise. Regarding the significance of these representations, both of the single and double bird, I fail to find any clew for explanation. Perhaps it is intended to indicate the true wedded life of men or of gods, since those hens live, as is known, monogamous, as do many other species of wild fowl. Perhaps they express some motives, which render the birds so important in the minds of other peoples. This I will explain below.

Fig. 5 [our fig. 240]. A double eagle on the fife

spreading the wings, with the tail raised, as if preparing for a downward flight to the earth, in contrast to the prairie hen (fig. 4), which, beyond doubt, aims to rise. The double eagle has but one body and one pair of wings; the tail, however, is quite broad and shows a slightly marked division. In neither of the two figures are the legs plainly shown, as the former are attached to the fife by a rudely formed connection of clay. The double figure has a sharply curved eagle-like beak. The entire shape of the head reminds one of the ancient Mexican representations of the white-headed eagle in Central and South America. Our collection possesses several of these figures in clay. It is therefore very probable that the pre-Columbian Mexicans connected a certain significance with a double eagle, which also became an important symbol of power with many civilized nations.

Fig. 242 represents one of a series of pear or gourd-shaped whistles,

¹ Adolf Bastian, *Festschrift zum 26 Juni, 1896*, p. 563.

with a tapering stem or neck, which served as a mouthpiece. It is modeled in gray-colored clay and unpainted, with the exception of the mouthpiece, which is colored dark red, and highly polished. The front portion of the instrument is ornamented in relief, and on the opposite side is a raised loop, forming a suspension hole. It has one sound hole near the base of the air chamber, and two notes are possible:



the lower tone with the sound hole closed.

The American Museum of Natural History in New York City possesses a number of pottery whistles somewhat similar to the foregoing (fig. 242). Six of these are of tolerably fine clay with the usual red painted surface, and are extremely crude representations of birds. The others, a dozen or more, were exceedingly rough, unpainted, and nearly all spherical. None of the instruments had more than one finger hole and consequently a scale of only two notes.

Fig. 243 represents another instrument of the class, with more elaborate ornamentation. It has but one finger hole, and with the normal force in blowing the following tones are produced:



By using more force the lower note can be raised a full tone, thus:



the higher note not being affected. Specimen, Cat. No. 27870 (U.S.N.M.)

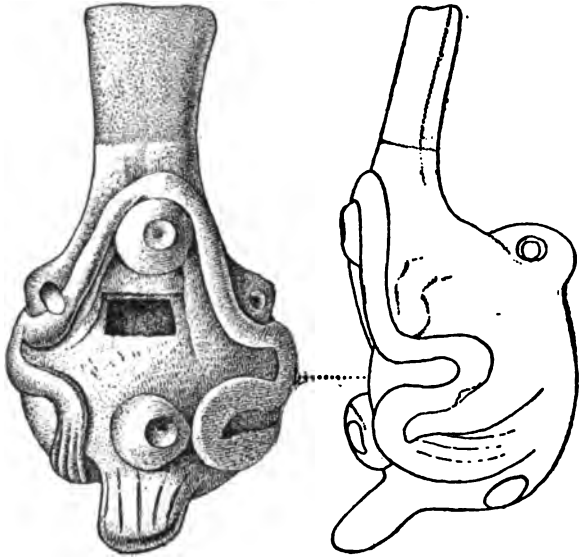


Fig. 243.

POTTERY WHISTLE, ORNAMENTED.

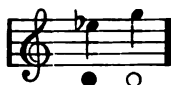
Tlatelolco, Mexico.

Cat. No. 99108, U.S.N.M. $\frac{1}{3}$ natural size.

is one of the same general description. Its musical capacity is here given:



The notes given by another example belonging to this series (Cat. No. 196676, U.S.N.M., Phillips collection) are indicated in the following scale:



In fig. 244 is outlined a whistle of more elongated form, but in principle the same as those just described. Its two notes are as follows:



Another whistle not figured (Cat. No. 133211, U.S.N.M.) belongs to the series. It is small and without any decoration. The two notes are as follows:

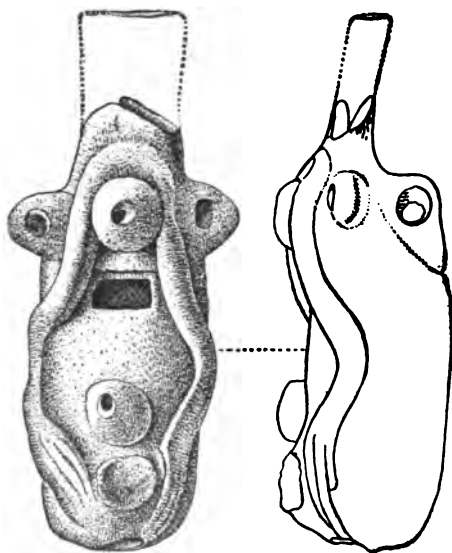


Fig. 244.

POTTERY WHISTLE, ELONGATED FORM.

Tezcuco, Mexico.

Cat. No. 99074, U.S.N.M. Natural size.

Fig. 245 represents one of the larger specimens, in the shape of a grotesque human figure. The tapering mouthpiece is missing. There is no finger hole, and its one note is here indicated:



This instrument was dug up by the Mexicans in constructing fortifications near the site of the ancient city of Tezcuco, near the close of the United States and Mexican war. Instruments of this class will be found in the Poinsett collection, Museum of the Academy of Natural Sciences, Philadelphia.

Fig. 246 represents a whistle of a highly complicated design. A better idea of its appearance can be gained by referring to the sketch than is possible from a written description. Part of the mouthpiece is wanting, but it was probably furnished with one similar to those on the whistles heretofore described, and is here indicated by dotted lines in the sketch. It is the largest whistle in the Museum collection from

Mexico, and the volume of tone is in proportion to the size of the instrument. The note produced is here given:



In fig. 247 is shown a small whistle of unpainted black ware. It represents a grotesque human head. The neck serves as a mouthpiece and there is one sound hole placed under the chin. With the hole open no distinct tone can be made; when closed the following note is emitted:



The American Museum of Natural History in New York City has two whistles similar to the foregoing, but representing a death's head or mask.

Fig. 248 shows another whistle caricaturing the human face. (Received from Hugo Finck.) It is modeled in coarse reddish clay and not painted. The air passage is through the neck and the venthole is represented in the widely open mouth. The interior of the head, which forms the air chamber, is so filled with earth and the specimen otherwise so mutilated that no sound can be obtained. This figure is only inserted in order to show the variety of forms which occur in these instruments.

One example of a bird-shaped whistle (Cat. No. 196677, U.S.N.M., Phillips collection) is suggestive of the instruments so often found in

Central and South America. It is roughly executed in dark gray-colored clay, unpainted. The legs and part of the head are broken and missing. There are four finger holes, two on each side of the body. These, being of unequal sizes, increase the number of sounds possible, but these differences (in size) were probably not intentional, as all the details of modeling show haste or unskilful work. The tail serves as a mouthpiece, and the notes obtained by a simple method of fingering are shown in the following scale:



Fig. 245.

POTTERY WHISTLE.

Tezcuco, Mexico.

Cat. No. 10069, U.S.N.M. $\frac{3}{4}$ natural size.

Intermediate notes can be obtained by cross fingering.

Fig. 249 represents a tubular instrument of coarse red clay with a flageolet-like mouthpiece. On the upper part of the lower extremity

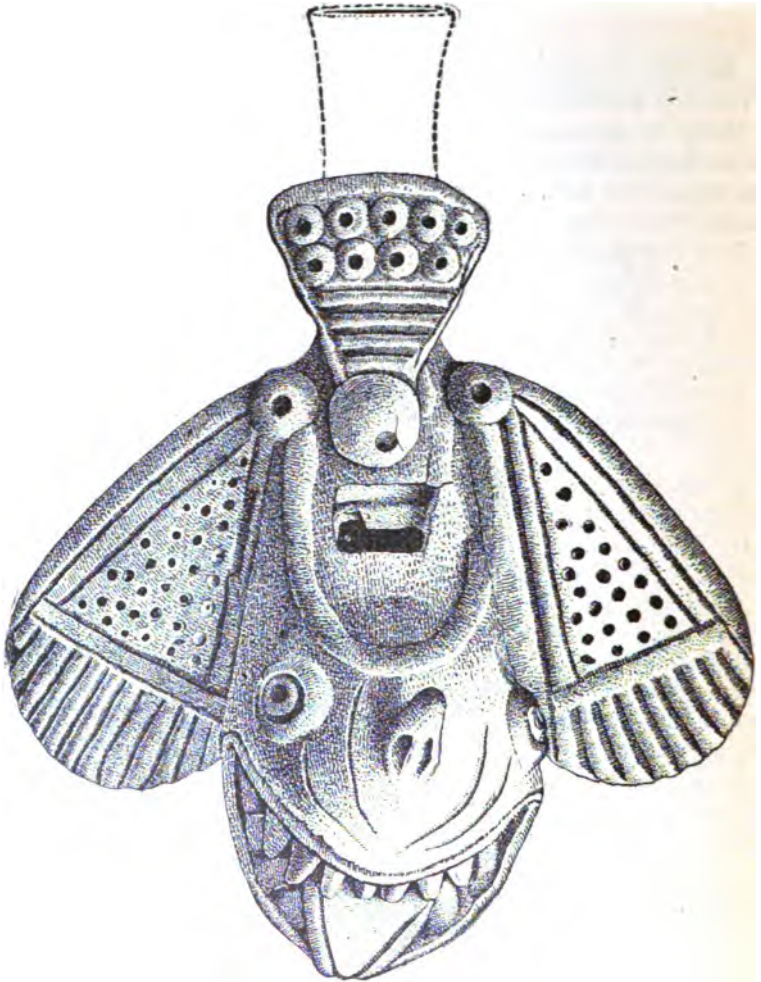


Fig. 246.

LARGE POTTERY WHISTLE, COMPLICATED DESIGN.

Excavations near Mexico by Dr. Antonio Penafiel.

Cat. No. 10482, U.S.N.M. $\frac{1}{2}$ natural size.

(part of which is missing) is represented the head and part of the body of a serpent-like animal, but on account of weathering the features are not distinguishable. There are no finger holes, and its one note is as follows:



An instrument of the same class is shown in fig. 250. It is of like

material and from the same locality as the preceding. The ornamentation, however, is different. Attached to the upper part of the tube about midway from each end is a disk ornamented in relief. Back of this are two projecting wings, and a sort of tail curves over the end of the tube, but leaving the bore entirely open. There are no finger holes, and the whistling apparatus is so much damaged that no musical sound can be produced.

Tubular instruments with four finger holes and but little, if any, added decorations are represented in the National Museum by three specimens found by Mr. Edward Palmer while exploring a cave situated in the Hortices district about 28 miles east of Colima, Mexico. All are modeled in rather coarse reddish clay. The largest (fig. 250a) measures $13\frac{1}{4}$ inches in length by $\frac{3}{4}$ inch in outside diameter, the bore or inside being $\frac{1}{8}$ inch. The mouthpiece is formed by closing and flattening one end of the tube, and has the usual air passage and venthole. The finger holes are a little less than $\frac{1}{4}$ inch in diameter, and are placed $\frac{1}{2}$ inch apart, the lower one being 1 inch from the end of the tube. This instrument is well preserved, but for some reason the tones emitted are weak, and can only be produced by blowing softly. The notes are as follows:



A smaller example (Cat. No. 197172, U.S.N.M.) is the same in principle. The venthole is, however, placed on the lower side (directly reversed from its position on the large instru-

ment), and on the opposite upper surface, extending along the tube in a line toward the finger holes, a serpent is represented in low relief. The lower end is broken off, leaving only two finger holes. The remaining part measures $8\frac{1}{2}$ inches in length; outside diameter, $\frac{1}{8}$ inch, and the bore, $\frac{7}{16}$ inch. Its notes, which are round and full, are here indicated:



These are obtained by using ordinary force in blowing. Increased power will produce their octave, and, with added force, the fifth above is possible.

With the two instruments just described Mr. Palmer found a double flute or flageolet (fig. 250b). The tubes seem to have been made separately and then joined together. At the lower end of each are four finger holes of the same size and distance apart as given in fig. 250a.

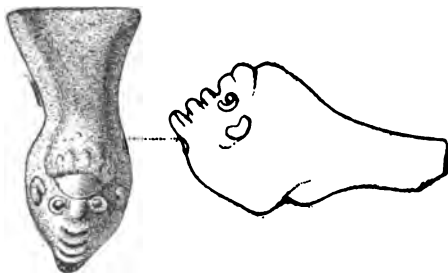


Fig. 247.

SMALL POTTERY WHISTLE, GROTESQUE HUMAN HEAD.

Tlaltelolco, Mexico.

Cat. No. 99072, U.S.N.M. $\frac{3}{4}$ natural size.

The mouthpiece is broken off and missing, and whether the sounds produced were in unison or not it is impossible to determine.

The instrument represented by fig. 251 is more like the modern flagolet in shape than any in the series. The lower part is missing, but its probable outline is indicated in the sketch by the dotted lines.

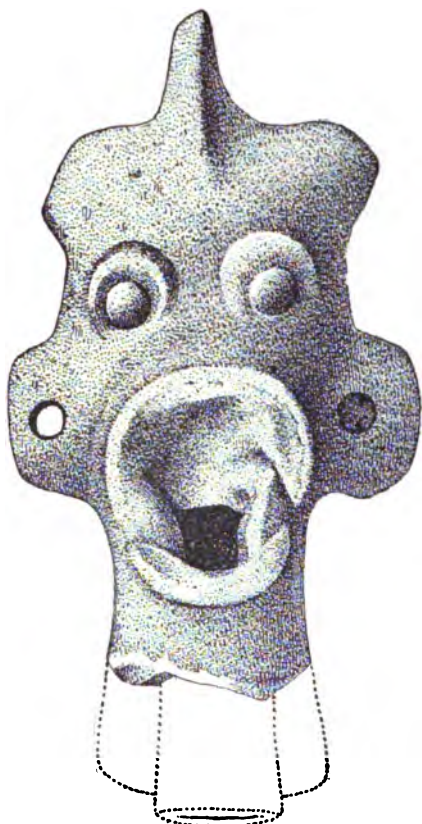


Fig. 248.

POTTERY WHISTLE, CARICATURE OF HUMAN FACE.

Ruins near Cordova, Mexico.

Cat. No. 9316, U.S.N.M. $\frac{3}{4}$ natural size.

Çoçolotli) of the previously mentioned paper, and a translation of his description kindly furnished by Mr. O. W. Shoemaker, of the Department of International Exchanges, Smithsonian Institution, here follows:

The bell mouth is ornamented on the outer surface (fig. 1). The ornaments are apparently done by hand. They make a neat finish, which shows a taste for regular ornamentation and an advanced technique in the working of the, in itself, somewhat ungrateful material. The ornamentation of the bell mouth is often very rich and elegant.

is modeled of gray-colored clay, highly polished, and has band decorations in red. The long, slender mouthpiece and upper part of the cylinder containing two finger holes is all that remains. Entire, it probably had four holes, the usual number in instruments of this shape. The notes that can be produced now are as follows:



This, of course, hardly gives an idea of the pitch and compass of the instrument originally. Specimen, Cat. No. 133212 (U.S.N.M.) evidently belongs to this class—nothing remaining, however, but the mouthpiece and enough of the cylinder to produce one note, thus:



Professor Kollman¹ describes an instrument (one of twenty-four) of this class from Mexico, deposited in the ethnographic collection in Basel. It is fig. 1 (Flöte,

¹ Adolf Bastian, Festschrift zum 26 Juni, 1896, pp. 560, 561. See p. 596.

The bell mouths were painted with a white color, which now remains for the most part only in the deeper parts, but formerly probably covered the entire ornament. All the bell mouths with which I am acquainted are somewhat ornamented. In the flutes of reddish clay, the mouthpiece, almost to the wind hole, is often an intense red, and in color reminds one somewhat of terra sigillata. Neither the red nor the black color, however, is to be attributed to glazing, but to a coloring matter which was burned in.

A description of the twenty-four flutes or fragments of flutes would be superfluous in this place. They all resemble one another in a high degree. The number of the finger holes, the form of the wind hole and of the mouthpiece, is alike in all. They differ only in the color (red and black); in height, which varies from $17\frac{1}{2}$ to $25\frac{1}{2}$ centimeters; in the decoration of the bell mouth; and in the number of the color rings, which sometimes encircle the tubes near the finger holes.

All the flutes which have hitherto been made known from Old Mexico are not alike in form, according to letters of Mr. Seler; the flutes mentioned in the manuscript of the Biblioteca Laurenziana are formed more like oboes, so far as the mouthpiece is concerned. It is bent at an obtuse angle. These flutes have also four finger holes, but no bell mouth. The tube is rather cut diagonally at the end. For an ornament

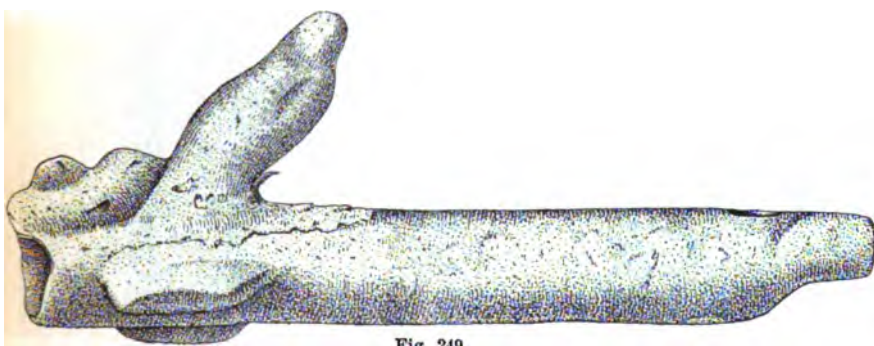


Fig. 240.

TUBE-SHAPED POTTERY WHISTLE.

Cordova, Mexico.

Cat. No. 20037, U.S.N.M. $\frac{3}{4}$ natural size.

there is a neat red patch on the tube above the finger holes, while the color of the flute appears bright yellow. From the color it is to be assumed that the flutes pictured in the Sahagun manuscript were made of reed. The red mass is doubtless the loop of riband or a small leather strap.

In the collection of Gabriel Mas, in Munich, there is a flute which has a divine figure on the front, probably Xipe the "Geschundenen."

He adds in a footnote (2, p. 559):

It is not correct to designate this instrument as a flute; flageolet would be better. A flute occurs in Europe under this name, and which is made on the same principle. But I will not quibble about the name flute, because it already occurs in literature.

We are indebted to Mr. A. E. Douglas, of New York, for the loan of a flageolet (entire) from the valley of Mexico.¹ Its shape is practically the same as outlined in fig. 251. A short description and its musical capacity are here given.

¹ This specimen was purchased by Mr. Douglas from the Boban collection of Mexican antiquities sold in New York City, December, 1886, called in the catalogue (No. 14) Uilacapitzli, and from the valley of Mexico.

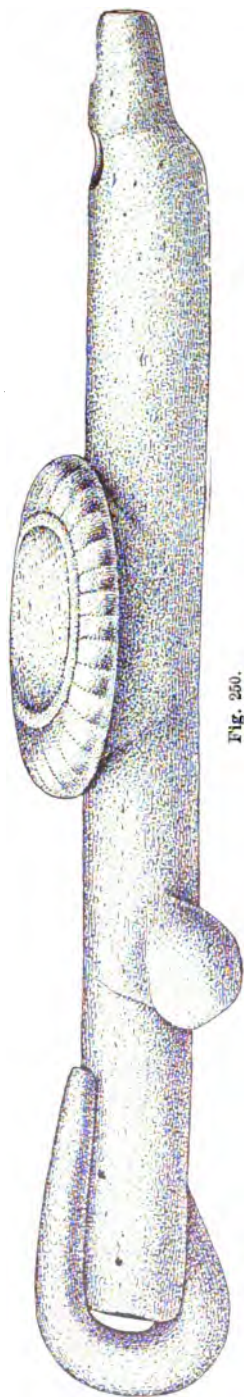


Fig. 250.

TUBE-SHAPED POTTERY WHISTLE.

Cordova, Mexico.

Cat. No. 30036, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 250a.

TUBE-SHAPED INSTRUMENT OF POTTERY.

Collima, Mexico.

Cat. No. 197171, U.S.N.M. $\frac{1}{2}$ natural size.

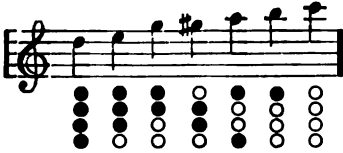
Fig. 250b.

DOUBLE FLUTE OR FLAGEOLET OF POTTERY.

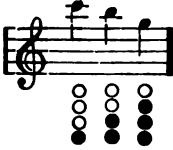
Collima, Mexico.

Cat. No. 197172, U.S.N.M. $\frac{1}{2}$ natural size.

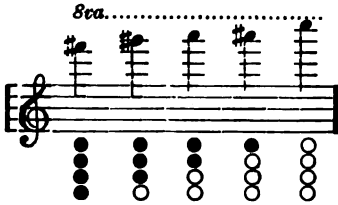
The body of the instrument is painted dark brown and ornamented near the lower end with three bands in red. The bell (or flaring end) is not painted, but is ornamented in relief. The painted portion is highly polished. With normal force in blowing the following tones can be made; fingering as indicated in the accompanying scale:



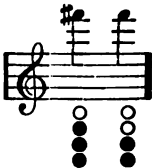
The notes c, b, g, can also be obtained by using the following method:



With increased force the following notes are given:



The note F# can also be made by fingering thus:



It hardly seems possible that these upper notes could or would be used to any great extent as the force required to obtain them makes it almost a physical impossibility.

The Poinsett collection in the Museum of the Academy of Natural Sciences, Philadelphia, contains a

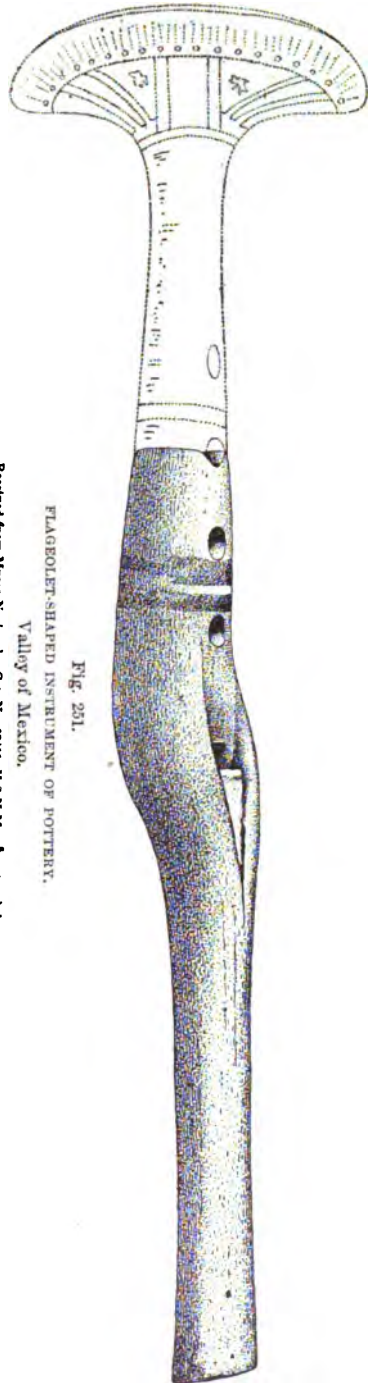


FIG. 251.
FLAGOLET-SHAPED INSTRUMENT OF POTTERY.

Received from Museo Nacional, Val. No. 97391, U.S.N.M. ♯ natural size.

number of instruments of this class. They are of the finely polished red and black ware and have four finger holes. All are more or less broken.

In the American Museum of Natural History at Central Park, New York, I saw one of these instruments with the bell mouth and decorations similar to fig. 251 just described, and also to specimens in the South Kensington Museum figured and described by Carl Engel.¹

But there were two others, in fragments, which, instead of ending in a bell-shaped mouth, terminated in a man's head, face or mask of the usual Mexican type. The face looked directly in front and was only slightly larger in diameter than the tube. The instrument itself was nearly a cylinder with no variations in diameter. The forehead and sides of the face were firmly attached to and formed part of the tube. The orifice or venthole for the expulsion of air is placed under the chin and corresponds to the throat.

Fig. 252 represents an instrument somewhat like those just described. It was lately presented to the Museum by Mr. Newton H. Chittenden, and is said to have been found in ancient Aztec ruins in Mexico. It is made of grayish-colored clay and painted black. The workmanship is rather rude and the clay not so well tempered as in some of the specimens before mentioned. The upper part is in the form of a grotesque human head with the tongue protruding. The headdress is quite elaborate and contains the whistling apparatus. There are two projections, one on each side of the hollow tube, which are ornamented with incised lines. The expanding bell-shaped end is decorated in relief, and with incised lines and dots. There are four finger holes, but so much of the mouthpiece is missing that its former musical capacity can not be ascertained.

The collection of Mrs. J. Crosby Brown, of New York, in the Metropolitan Museum of Art, Central Park, contains a number of instruments similar to the foregoing. They are figured in an interesting work entitled *Musical Instruments and their Homes*.² Referring to these instruments the author says in part:

We must distinguish three different classes. The first consists of those which have been introduced by the European invaders, the second consists of the instruments of native origin now in actual use, the third class are those which have been preserved in the various mounds and pyramids of the Aztecs.

To the latter class the instruments here described undoubtedly belong.

An instrument presented by Mrs. J. Crosby Brown is shown in fig. 253. It is in the form of a reptile highly conventionalized. The body is a cylindrical tube, with the open end projecting below the neck of the reptile. At the opposite extremity the tube is enlarged somewhat to accommodate the whistling mechanism, and a tapering continuation forms the tail, which serves as a mouthpiece. There are four finger holes on the upper part or back. The lowest tone is obtained with all

¹ *Musical Instruments*, p. 62.

² Brown, *Musical Instruments and their Homes*, p. 311, figs. 6-9.

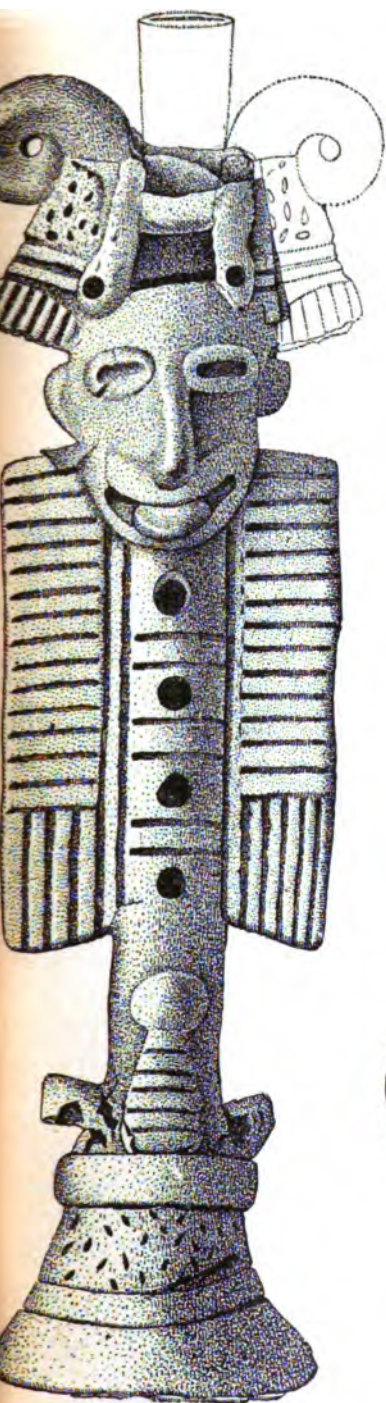


Fig. 252.

FLAGEOLET-SHAPED INSTRUMENT OF POTTERY.

Aztec ruins, Mexico.

Cat. No. 172919, U.S.N.M. $\frac{1}{2}$ natural size.

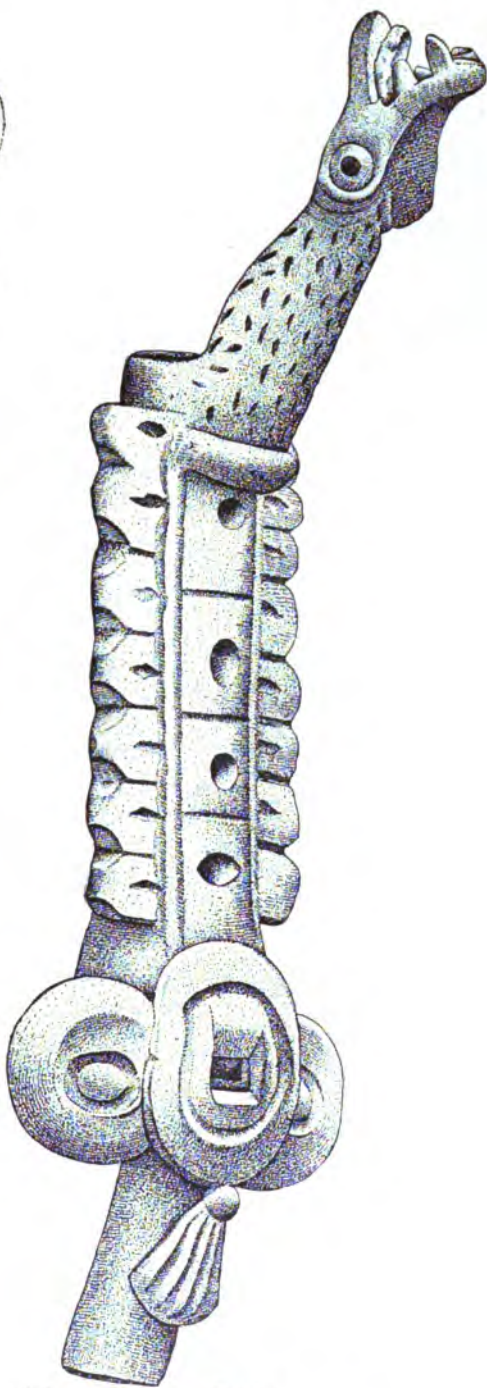


Fig. 253.

FLAGEOLET IN FORM OF REPTILE.

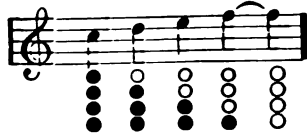
Mexico.

Cat. No. 93573, U.S.N.M. $\frac{1}{2}$ natural size.

holes closed. Fingering from the open end toward the mouthpiece the following notes are emitted: Scale No. 1.



Reversing the process of fingering gives the following: Scale No. 2.



By this combination the tone $F\sharp$ is the same with all open or one hole stopped. The note $C\sharp$ can only be made by fingering, as shown in scale No. 1.

Fig. 254 represents an instrument carved in marble. The upper end is broken, but was evidently fashioned for the insertion of a mouthpiece similar to the modern flageolet, a portion of the vent hole still remaining. It has six sound holes, and the lower end is carved in imitation of an alligator's head. A hastily constructed mouthpiece of wood (see restoration) was inserted by the writer, and a rather imperfect scale obtained. The antiquity of this instrument may not be very great. The fact of its having six finger holes suggests European contact, as in all other specimens of this class from the Western Hemisphere the usual number appears to have been four holes.

Prehistoric musical instruments made of wood are extremely rare. A material which decays so easily can not resist the influences of time, except under favorable conditions which retard its destruction. The wooden objects in the National Museum classed as prehistoric were all obtained from burial places, either in caves or graves.

Fig. 255 represents a whistle made from a hollow reed or cane. It was found in a prehistoric cavern near the Bay of Angeles, Lower California. One end is closed with resin and forms an air chamber. About 3 inches from the open end, which served as a mouthpiece, is a joint or knot in the

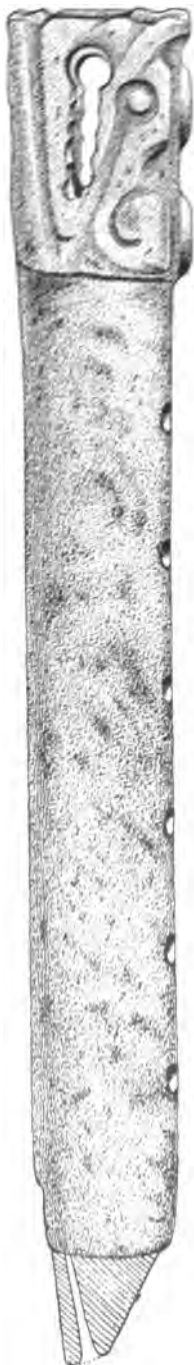


Fig. 254.

INSTRUMENT CARVED IN MARBLE.

Mexico.

(Cat. No. 9849, U.S.N.M. ♀ natural size.)

reed. At this point the tube is scooped out, leaving the natural barrier or division exposed. This formed a stop, which deflected the current of air (when blown into the open end) in the same manner as does the transverse ridge of asphaltum in the bone whistles from California heretofore described (p. 567). The outer surface is ornamented with incised bands and dots, which appear to have been burnt in. The specimen is so much weathered that no definite sound is emitted. A smaller whistle from the same cavern differs only in having both ends open. The lateral hole is at the joint, as in the foregoing. These instruments are a part of a collection obtained by Mr. Edward Palmer, who made the exploration in 1887.¹

A flageolet, obtained from the Yaqui Indians of Sonora, Mexico, is shown in fig. 256. It is made of cane, strengthened with bands of sinew. There are three sound holes, two on the upper surface near the lower end, and one below (which does not show in the drawing), placed between the third and fourth bands from the lower end. Length, $21\frac{3}{4}$ inches. A wooden plug cut away on one side so as to leave an air passage was inserted at the upper end and formed the mouthpiece.



Fig. 256.

WHISTLE MADE FROM HOLLOW REED.

Cavern, Bay of Angels, Lower California.

Cat. No. 139636, U.S.N.M. $\frac{3}{4}$ natural size.

During the progress of this paper, Mr. Wilson, profiting by his attendance as Commissioner-General of the United States at the Brussels International Exposition, 1897, visited the extensive Musée Instrumental of the Conservatory of Music of Brussels. Its curator, M. Mahillon, himself a musical-instrument maker, having devoted much time, labor and money to its successful accomplishment, has united the musical instruments of all nations. He has prepared an analytic and descriptive catalogue of the instruments under his charge, which greatly increases the value of the collection. The policy of the Belgian Government has been to invoke for the benefit of the Museum the aid of its foreign representatives in the procurement of local instruments, whether primitive or modern. As a result, it has been, through the good offices of M. Dorenberg, Belgian consul at Puebla, Mexico, the fortunate recipient of a collection of Mexican instruments, all of which are primitive, but quite a number prehistoric. These include the *Toponaztli* (Spanish *Atabal*) or drum, the *Marimba*, and the *Chirimia* (a sort of hautboy), and are said to be used together forming a primitive band. Along with these is a series, twenty-five, more or less, of whistles or flageolets similar to those heretofore represented. They figure in the Museum catalogue as Nos. 819-821, 832-856, inclusive. Most of them are apparently without holes and give but a single note which is remark-

¹ Report U. S. Nat. Mus., 1888, p. 127.

able for its high pitch, Nos. 848, 849 especially so, being F, two octaves above the staff.

No. 832 has four holes and sounds five notes, from G flat to C above the staff. Nos. 852, 853 have a somewhat large and indefinitely oval shape, each with four holes and sounding five notes, the former from C to A flat, and the latter from C to B sharp, both above the staff. No. 855 is a vase ornamented with relief representing the figures of men and animals. Around the neck of the vase, attached to, and forming part of the body, with the other ornamentation, are six whistles or flageolets, the mouth hole in each making its appearance on the inner edge of the neck. None of these have finger holes, and each gives but a single note, varying between A and B flat above the staff. No. 838 is a flageolet representing a salamander or alligator similar to fig. 253. It has six holes, the two lower ones of which make no variation in the pitch. The scale of the instrument runs from C to G sharp within the staff.

CENTRAL AMERICA.

SAN SALVADOR.

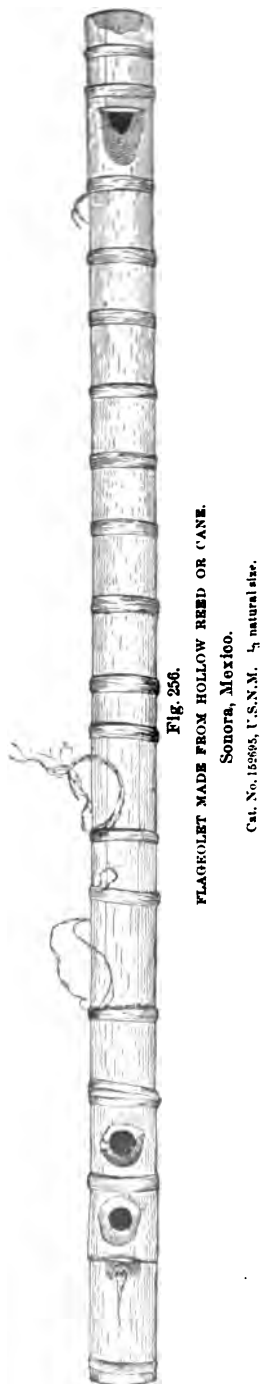
Whistles.—Only a few musical instruments from San Salvador, Central America, are represented in the Museum collection. In fig. 257 is shown a pottery whistle of unpainted ware in the shape of an animal head. There are no sound holes, and only one note is emitted:



Fig. 258 represents a front and profile view of a whistle, also unpainted, from the same locality. It has a bird-shaped body with grotesque human or animal head. All the features are rudely executed. The tail serves as a mouthpiece, and there are two sound holes in the breast. Its three notes are as follows:



Specimen, Cat. No. 9642 (U.S.N.M.), is a whistle in the shape of an animal head. The mouthpiece is broken and a pure tone cannot be obtained.¹



¹ The three specimens from San Salvador were received from Capt. J. M. Dow.

NICARAGUA.

Whistles or flageolets.—There are in the Museum a number of pottery whistles or flageolets from various localities in Nicaragua, collected by Dr. J. F. Bransford and Dr. Earl Flint, of the United States Navy, and also others lately received from the Nicaraguan Government. The latter are part of the Government collection exhibited at the Columbian Historical Exposition held at Madrid in 1892.

Fig. 259 represents a grotesque bird-shaped whistle of black ware from Ometepe Island, Lake Nicaragua. It is part of a collection made by Dr. J. F. Bransford in Nicaragua and described by him in "Archæological Researches in Nicaragua."¹ There are two finger holes in the back and the head serves as a mouthpiece. A raised fillet forms a loophole for suspension. Its three notes are as follows:

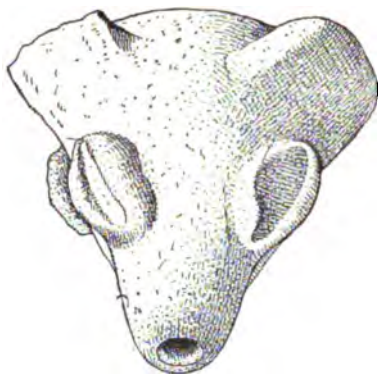
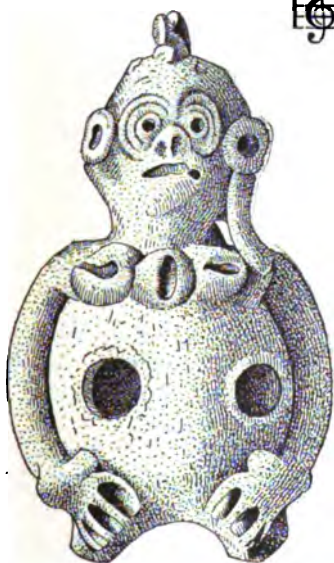


Fig. 257.

POTTERY WHISTLE—ANIMAL HEAD.
San Salvador.

Cat. No. 9643, U.S.N.M. $\frac{3}{4}$ natural size.

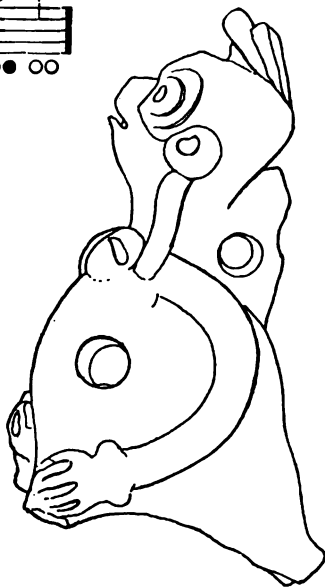


Fig. 258.

POTTERY WHISTLE—GROTESQUE.
Front and profile.

San Salvador.

Cat. No. 9658, U.S.N.M. Natural size.

Specimen, Cat. No. 28886 (U.S.N.M.), collected by Dr. Bransford

¹ Smithsonian Institution Contributions to Knowledge, XXV, p. 44.

from the same locality, represents the head of an animal. There are two finger holes in the top of the head and a long pointed nose serves as a mouthpiece.¹ The notes emitted, which are strong and full, are here indicated:



Specimen, Cat. No. 32768 (U.S.N.M.), also from Ometepe Island, is a small bird-shaped whistle of gray-colored clay, unpainted. The tail serves as a mouthpiece, as is usual in bird-shaped whistles, and there are two sound holes, one on each side of the breast. The neck is pierced for suspension. Its three notes are as follows:

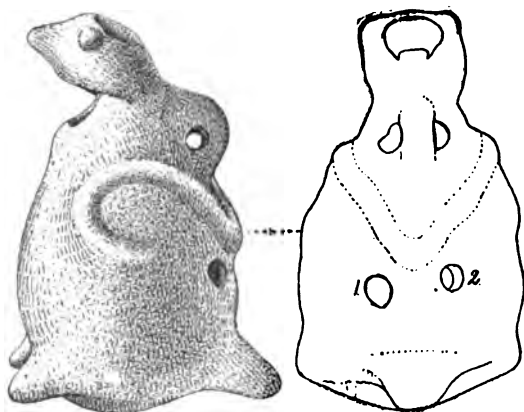


Fig. 259.

POTTERY WHISTLE—BIRD-SHAPED.

Front and profile.

Ometepe Island, Nicaragua.

Cat. No. 23759, U.S.N.M. Natural size.



Specimen, Cat. No. 48067 (U.S.N.M.), from Zapatera Island, Lake Nicaragua, was received from Dr. Earl Flint. It

is a small bird-shaped whistle of polished black ware, with one sound hole in the breast. Its two notes are as follows:



Specimen, Cat. No. 172036 (U.S.N.M.), from Alta Gracia, Nicaragua, is a whistle of black polished ware in the form of a sphere. There are two sound holes, and the decorations are in relief. The mouthpiece is missing. Received from the Government of Nicaragua.

Specimen, Cat. No. 172035 (U.S.N.M.) is a whistle from the same locality, of the same material, and formed by uniting two spheres. Mutilated. Received from the Government of Nicaragua.

Fig. 260 represents a capricious piece from Moyogalpa that was evidently intended for a whistle, although it is so much mutilated that no sounds can be obtained. It is formed of three spheres arranged trian-

¹ In all of the instruments with two sound holes, unless otherwise stated, the tone or note is the same, no matter which hole is stopped.

gularly and united by two fantastic animals. Received from the Government of Nicaragua.

Specimen, Cat. No. 172038 (U.S.N.M.) is from Nicaragua, but the exact locality is not given. It is of polished black ware in the form of a tortoise. There are two sound holes in the back and the tail served as a mouthpiece. The air passage is broken, and a correct tone is impossible.

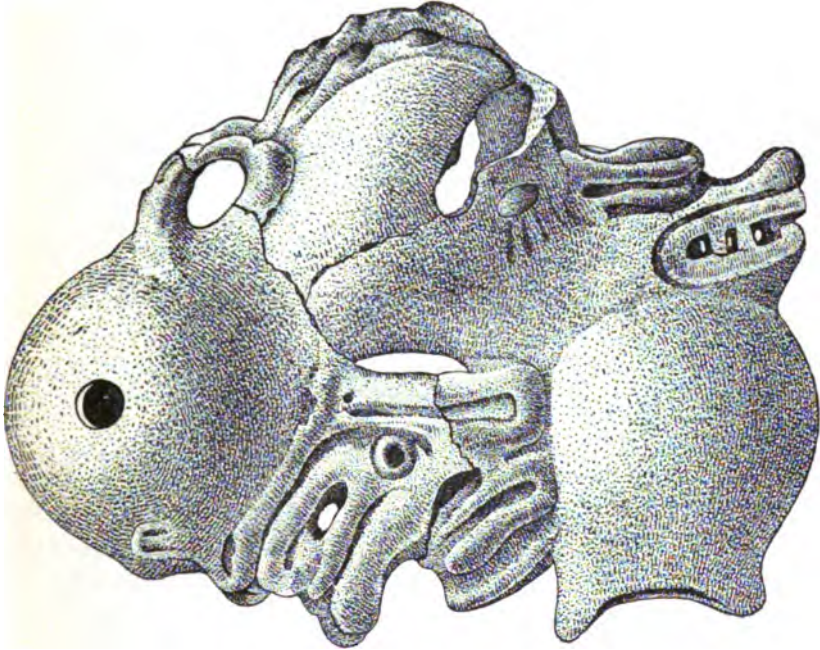


Fig. 260.

POTTERY WHISTLE—CAPRICIOUS PIECE.

Moyogalpa, Nicaragua.

Received from Government of Nicaragua.

Cat. No. 172014, U.S.N.M. $\frac{3}{4}$ natural size.

COSTA RICA.

Musical instruments of percussion are wanting in the museum collection of prehistoric objects from Costa Rica, neither drums or rattles being represented. There is no reason to suppose, however, that none existed. Their immediate neighbors to the south (Chiriqui) have furnished numerous examples of both drum and rattle. Mr. W. H. Holmes, in speaking of the ancient art of Chiriqui,¹ says:

So far as the art of pottery has come within my observation, it appears to indicate a somewhat closer relationship with the ancient Costa Rican peoples than with those of continental South America.

¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 15.

Whistles or flageolets.—The instruments now to be described have the same relationship as regards form and musical capacity. Fig. 261 represents a small bird-shaped whistle of gray-colored clay, unpainted, from Acientio. There are four sound holes in the back and, as usual in instruments of this class, the tail serves as a mouthpiece. The following notes can be produced:



It will be noticed that the sound holes in the sketch are numbered 1, 2, 3, 4. The notes obtained by different combinations are here indicated:

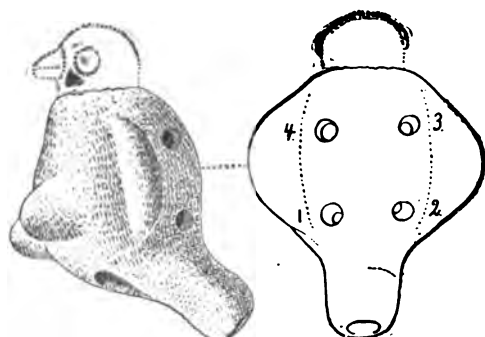


Fig. 261.

POTTERY WHISTLE—BIRD-SHAPED.

Front and profile.

Acientio, Costa Rica.

Cat. No. 28957, U.S.N.M. Natural size.

Finger holes all closed G

Nos. 1, 2, 3, or 4, open A

Nos. 1, 2

2, 3

3, 4

4, 1

1, 3

4, 2

Open B

Nos. 1, 2, 3, or 4, closed C

Finger holes all open C#

Specimen, Cat. No. 28954 (U.S.N.M.), from Las Canas, collected by Drs. Flint and Bransford, represents a fish. The material is dark clay, with a coating of gray color,

slightly polished. Its eyes are protruding, and on the back is a group of seven nodes, six arranged in a circle, with one in the center. The scales are imitated by marks made with the finger nail. The tail serves as a mouthpiece, and there are four sound holes, two on each side. Its five notes are as follows:



The lowest note is obtained with all holes closed, the highest with all open. The remaining intervals are the same, no matter which of the one, two, or three holes are opened.

Specimen, Cat. No. 60043 (U.S.N.M.) is from Nicoya, collected by Dr. Bransford. It is bird-shaped, with the legs and wings indicated in low relief. There are four finger holes on the back, two on each side

just above the wings. The head is missing, and when broken off, it carried away part of the air chamber, making it impossible to obtain a correct note. The surface is slightly polished.

Fig. 262 represents a bird-shaped instrument from Nicoya, collected by Drs. Flint and Bransford. It is of reddish brown clay. The decoration consists of deeply incised lines on the breast, back, and wings,

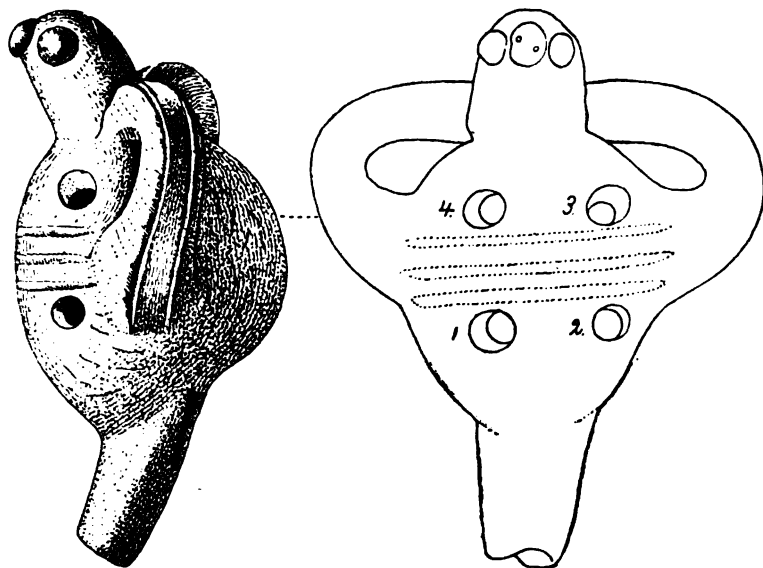


Fig. 262.

POTTERY WHISTLE—BIRD-SHAPED.

Front and profile.

Nicoya, Costa Rica.

Cat. No. 28952, U.S.N.M. Natural size.

the intervening spaces being highly polished. The remaining surface is roughly etched with zigzag lines. This work has evidently been done after the hardening of the clay. There are four finger holes on the breast, two above and two below the line decoration. The following scale indicates its musical capacity:



To make this intelligible the finger holes are numbered in the sketch and a system of fingering is here given showing the combination by which different notes are obtained:

Finger holes all closed	G ♭
Nos. 1 or 2, open	B ♮
Nos. 3 or 4, open	B ♯
Nos. 1 and 2 open	C ♯

Nos. 2 and 3 or Nos. 1 and 4	} open	D b
Nos. 4 and 2 or Nos. 1 and 3		
Nos. 3 and 4, open	.....	D b
Nos. 4 or 3, closed	.....	E b
Nos. 1 or 2, closed	.....	E b
Finger holes all open	.....	F b

This scale is made possible by the unequal size of the finger holes, which may be due to weathering or other causes.

Fig. 263 represents a bird-shaped instrument of dark brown clay. It also is from Nicoya, and collected by Dr. Bransford. This is one of

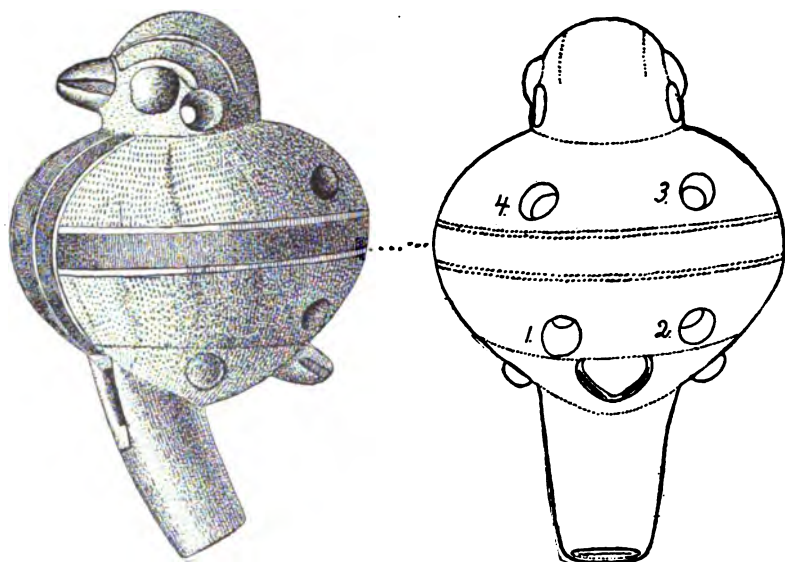


Fig. 263.

POTTERY WHISTLE—BIRD-SHAPED.

Front and profile.

Nicoya, Costa Rica.

Cat. No. 59969, U.S.N.M. $\frac{1}{2}$ natural size.

the best representatives from Costa Rica in the Museum, both as regards artistic skill in the manufacture and the purity of musical tones which it is capable of giving. Its shape is conventional, being somewhat top-like, with a bird's head placed on the upper part, the opposite extremity (upon which the feet are slightly indicated) being prolonged for a mouthpiece. Upon the breast, extending from the neck to the lower part of the body, are panel-like designs, indicated by deeply incised lines. Connecting with these, and passing around the largest circumference, is a narrow band, outlined in the same manner. The remaining portion of the body has the appearance of being stippled with a comb-like instrument, producing zigzag dotted lines, which are placed with some degree of regularity. The panels, band decoration,

and mouthpiece are highly polished. A suspension hole passes through the head. It has four finger holes on the back, two above and two below the band. Its five notes are as follows:



The lowest note is obtained with all holes closed; the succeeding intervals are the same by any combination of the remaining one, two, or three holes opened.

The preceding description with two exceptions applies to specimen, Cat. No. 59970 (U.S.N.M.), from the same locality. In this one the lower part is more simple in construction, having no indication of feet or tail, and the musical tones are differently pitched, as will be seen in the accompanying scale:



Specimen, Cat. No. 28953 (U.S.N.M.) is from Nicoya, collected by Drs. Flint and Bransford. It is bird-shaped and belongs to the same class as fig. 263. The specimen is so mutilated that no sound can be obtained.

Fig. 264 represents a whistle in grotesque form. It has a bird-shaped body with the head and fore feet of a cat-like animal. The body decoration consists of incised lines and dots in geometric patterns. The tail, which served as a mouthpiece, being lost, its musical properties are unknown. It is from Nicoya and was collected by Dr. Bransford.

Specimen, Cat. No. 60045 (U.S.N.M.) is a pear-shaped whistle from the same locality as the preceding number. The material is red clay, slightly polished. There are incised line panel-like designs on two sides. It has four sound holes and the notes emitted are:



The two lower notes only are clear.



Fig. 264.

POTTERY WHISTLE—GROTESQUE FORM.

Sardinal, Nicoya, Costa Rica.

Cat. No. 60044, U.S.N.M. Natural size.

In fig. 265 is shown an instrument from Nicoya in the form of a grotesque human head. The painted decorations are in brown and red on yellow ground. The slightly protruding eyes are outlined with a narrow stripe of brown, and the entire back of the head is covered with a

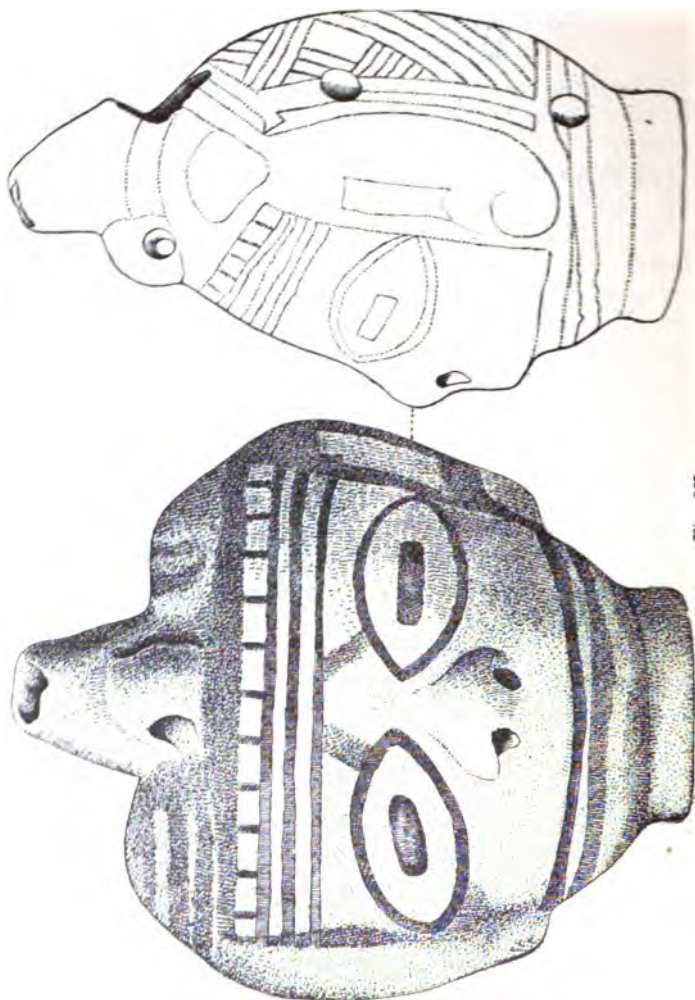


Fig. 265.
POTTERY WHISTLE—GROTESQUE HUMAN HEAD.
Front and profile.
Nicoya, Costa Rica.
Cat. No. 8007, U. S. N. M. Natural size.

panel-like design in the same color. The mouthpiece is attached to and forms part of the headdress. There are four finger holes, two on each side, back of the ears. Seven notes can be obtained as follows:



In this specimen the finger hole marked 4 on the outlined back view

(fig. 266) is larger than the others, the result being two additional notes that would not be obtainable were all the holes of the same size. The following system of fingering will serve to illustrate this:

Finger holes all closed	B \natural
Nos. 1, 2, or 3, open	C \sharp
No. 4, open	D \natural
Nos. 1 and 2 } Nos. 2 and 3 } open	D \sharp
Nos. 1 and 3 } Nos. 3 and 4 } open	E \natural
Nos. 2 and 4 } Nos. 1 and 4 } open	F \sharp
No. 4, closed	F \natural
Nos. 1, 2, or 3, closed	F \sharp
Finger holes all open	F \sharp

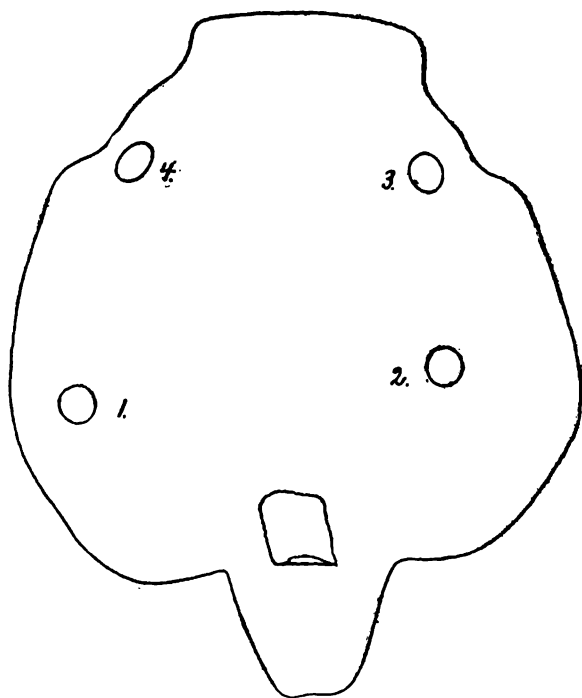


Fig. 266.

OUTLINED BACK VIEW OF FIG. 265, SHOWING POSITION OF FINGER HOLES.

Natural size.

Specimen, Cat. No. 60042 (U.S.N.M.), also from Nicoya and collected by Dr. Bransford. It is a painted whistle in the form of a grotesque figure in a squatting position, with the arms pressed against the body. The ground color is yellow and there are traces of decoration in dark brown. The eyes, nose, and mouth are in high relief.

A prolongation of the headdress serves as a mouthpiece, and there are four sound holes in the front portion of the body. The compass of the instrument is five notes:

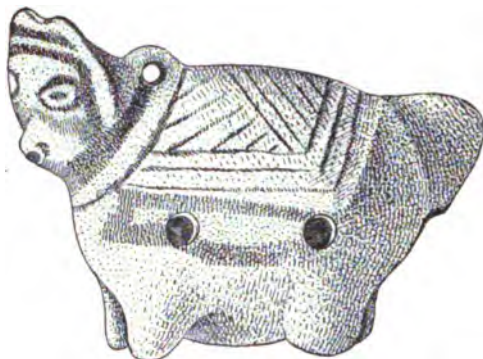


Fig. 267.

POTTERY WHISTLE—ANIMAL-SHAPED.

Nicoya, Costa Rica.

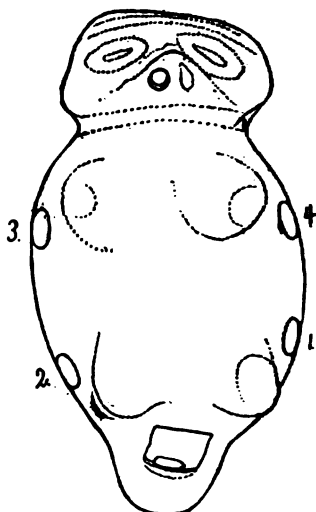
Cat. No. 29955, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 268.

OUTLINE OF FIG. 267, SHOWING POSITION OF FINGER HOLES.

The lowest note with all the holes closed; the succeeding intervals are the same by any combination of fingering.

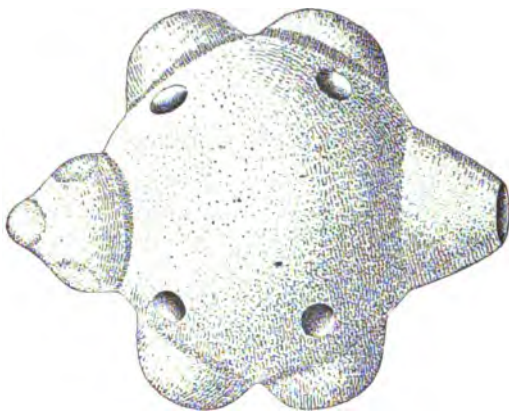


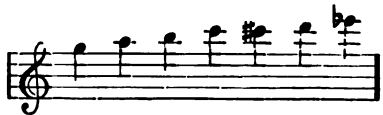
Fig. 269.

POTTERY WHISTLE—TORTOISE-SHAPED.

Costa Rica.

Cat. No. 29956, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 267 represents a whistle from Nicoya in the form of an animal. The painted decorations are in black and red lines on yellow ground. The tail of the animal served as a mouthpiece and there are four finger holes, two on each side of the body where the legs are joined. A raised loop on the back of the neck answers for a suspension hole. Its notes are shown in the following scale:



In this specimen finger hole marked 2 on outline (fig. 268) is larger than the others, and raises the pitch a

semitone when used open in combination. A system of fingering is here given:

Finger holes all closed.....	G
Nos. 1, 2, 3, or 2, 3, 4, closed	A
Nos. 1, 2, 3, or 4, 1, 2, closed	B
Nos. 1, 2, open	C
Nos. 4, 2, or 1, 3, closed.....	C
Nos. 2, 3, or 3, 4, or 4, 1, open	C#
Nos. 1, 2, 3, or 4, closed.....	D
Finger holes all open	E ^b

Specimen, Cat. No. 18119 (U.S.N.M.), is an animal-shaped whistle of painted ware from an ancient grave in Costa Rica. Collected by William H. Gabb. There are two sound holes, one on the left shoulder, the other beneath the body. Its three notes are shown in the accompanying scale:



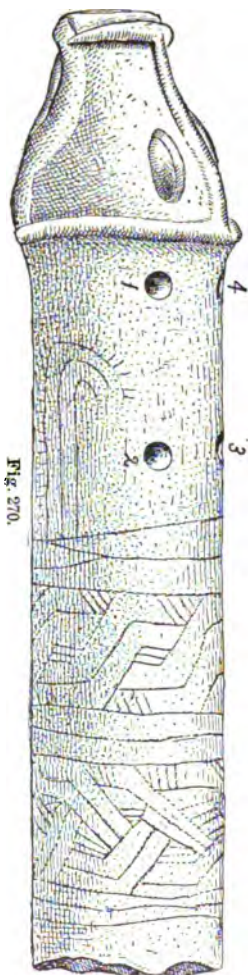
The note B^b is the same, stopped with either hole.

Fig. 269 represents a tortoise-shaped whistle of painted ware from Costa Rica, collected by Drs. Fliut and Bransford. There is no mistaking the animal to be represented, as all the features are well executed. The painted decorations in black and red lines are much obliterated. A hole for suspension passes through the lower part of the neck. There are four finger holes on the back. Its five notes are as follows:



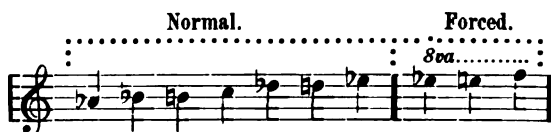
The lowest note with all holes closed. The next three intervals are the same, no matter which of the one, two, or three holes are opened. That is, any one of the four holes open, the others closed, will give G; any two open, A; and any three open, B^b. All open, the highest note, C.

Fig. 270 represents a tube-shaped instrument from Miravalles, collected by Capt. J. M. Dow. The upper end is in the form of an animal head and contains the mouthpiece. The lower end (part of which is



POTTERY WHISTLE—TUBE-SHAPED.
Miravalles, Costa Rica.
Cat. No. 6429, U.S.N.M. $\frac{3}{4}$ natural size.

missing) is closed, forming an air chamber about $5\frac{1}{2}$ inches long. There are four finger holes, two on each side of a center line on the upper surface. It is painted light brown and slightly polished. The space below the finger holes is ornamented with bands of incised-line chevron designs. Its musical capacity is shown in the accompanying scale:



A slight difference in size of the finger holes adds two notes to the compass of the instrument. The combinations for each tone are here given:

	Normal.	Forced.
Finger holes all closed	A \flat	E \flat
No. 1 or 4, open	B \flat	F \sharp
Nos. 1 and 4, open	B \natural	F
Nos. 1 and 2 or 3 and 4 or 1 and 3, open	C	E \sharp
Nos. 2 and 3 or 2 and 4, open	D \flat	F
Nos. 1, 2, 3, or 4, 3, 2, open	D \natural	F \sharp
Finger holes all open	E \flat	F

The three forced tones shown in the scale are all that can be obtained, no matter what combination of fingering is used.



Fig. 271.

WHISTLING VASE.

Costa Rica.

Cat. No. 107356, U.S.N.M. $\frac{2}{3}$ natural size.

Fig. 271 represents a specimen from Costa Rica that is unique. It was received from Señor Rafael Iglesias. It is a round bottomed painted vase with a handle on one side representing an animal head, holding the edge of the rim in its mouth. The rim and lower half of the vase is dark red color, the space between being filled by a broad chevron band in brown and yellow. The features of the animal head are accentuated by lines of brown, and the whole outer surface is highly polished.

The air passage is from the inside of the vessel, connecting with a vent hole on the outside of the animal's neck. To produce a sound or note the lips must be placed against the mouth of the vessel in the same manner as would be done

on the large brass instruments of to-day. Its one note is exceedingly shrill and piercing:



A description of some of the musical instruments belonging to now existing tribes in Costa Rica may prove interesting, as showing, by comparison, that their remote ancestors were equally if not more advanced in the art of music.

Specimen, Cat. No. 15413 (U.S.N.M.) is a wooden drum used by the Bri Bri and Tiribi Indians, one of a number presented by Mr. William M. Gabb. The shell is of dark-colored wood in the form of a tapering cylinder—or more like one-half of an hourglass. The head is made of the skin of the iguana lizard (*Iguana tuberculata*?), cemented to the top with the fresh blood and held in place by a cord until dried. It is held under the left arm suspended by a cord over the shoulder, and is beaten by the fingers of the right hand. Length 23 inches, diameter $6\frac{1}{2}$, tapering to $4\frac{1}{2}$ inches.

Fig. 272 represents a whistle made from the leg bone of a small mammal. It is from the Tiribi Indians of Costa Rica, and was presented by Mr. Gabb. The upper end has been cut away and the cavity filled with pitch or gum. Through this an air passage connects with a vent hole $2\frac{1}{2}$ inches from the end. At the lower part is a lateral opening into the natural cavity of the bone. Length 10 inches, diameter 1 inch. Its one note is here given:



Fig. 273 represents a primitive flageolet, made from a slender bone, probably from the wing of the brown pelican (*Pelecanus fuscus*). It is also from the Tiribi Indians and was collected by Mr. Gabb. The natural cavity at one end of the bone is partly filled with wax or gum, leaving an air passage which connects with a vent hole placed $\frac{7}{8}$ inch distant. This forms a mouthpiece. The other end is open. On the upper surface are five small finger holes, placed about $\frac{7}{8}$ inch apart.

Considerable attention has been given to the musical possibilities of this instrument because of its striking resemblance to the bone whistles from ancient graves on the California Coast and the adjacent islands (p. 571, fig. 211). What may be called its natural scale of six notes is here shown, with the fingering for each tone.



The upper note, G, is obtained with a slightly increased force in blowing. By using greatly increased force and a different system of finger-

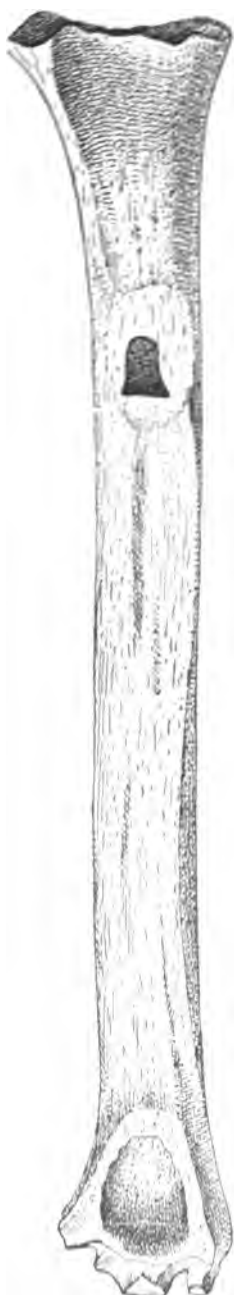
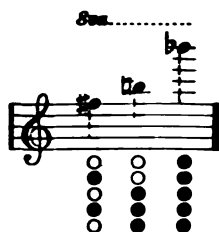


Fig. 272.
BONE WHISTLE.
Costa Rica.
Cat. No. 15390, U.S.N.M.
§ natural size.



Fig. 273.
BONE FLAGEOLET.
Costa Rica.
Cat. No. 15108, U.S.N.M.
§ natural size.

ing. the notes shown in the following scale are possible:



Other combinations of fingering only produce notes which are already given. It will be seen that, contrary to all the instruments before described, the lowest note is not made with all the sound holes closed. Why this should be so I am unable to explain. Perhaps the peculiar shape of the bone may account for it.

SOUTH AMERICA.

CHIRIQUI, COLOMBIA.

The most important group of prehistoric musical instruments in the Museum in point of numbers is from Chiriqui, deposited by Mr. J. A. McNiel. It embraces drums, rattles, and whistles of pottery, and a number of bronze bells. Many of these have been figured by Mr. W. H. Holmes in his interesting paper on "Ancient art in the Province of Chiriqui,"¹ and his descriptions have been here freely used. Whatever will be said in addition relates to examples not figured by him, and is mostly from a musical standpoint, all of the wind instruments having been tested for the purpose of showing their capacity or possibilities in that direction.

¹ Sixth Annual Report of the Bureau of Ethnology, p. 156.

INSTRUMENTS OF PERCUSSION.

Drums.—Fig. 274 represents a drum of gray unpainted clay. According to Mr. Holmes—¹

The shape is somewhat like that of an hourglass, the upper part, however, being considerably larger than the base or stand. In all cases the principal rim is finished with especial reference to the attachment of the vibrating head. The example presented has a deeply scarified belt an inch and a quarter wide encircling the rim, and below it is a narrow ridge,

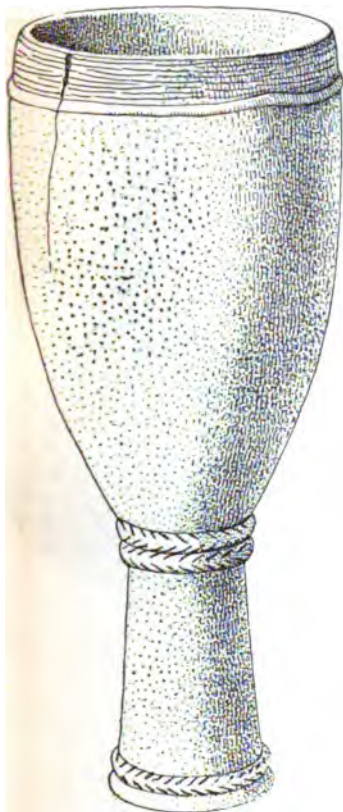


Fig. 274.

DRUM OF GRAY UNPAINTED CLAY.

Chiriqui.

Cat. No. 115353, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 275.

DRUM WITH PAINTED ORNAMENT.

Chiriqui.

U. S. National Museum.

intended, perhaps, to facilitate the lashing or cementing on of the head. Two raised bands, intended to imitate twisted cords, encircle the most constricted part of the body, a single band similarly marked encircling the base. The surface is gray in color and but rudely polished. The walls are about three-eighths of an inch thick, the height $19\frac{1}{2}$ inches, and the greatest diameter $7\frac{1}{2}$ inches.

¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 158, fig. 236.

The following is copied from Mr. McNiel's label attached to the drum: Grave at Moritana del Bufo, Divala. This and 14 canteros, 1 stool, 5 stone hatchets, 3 "spinners," and human bones, seem to have been the outfit of a musician.

Mr. Holmes continues (p. 159, fig. 237):

The decorated specimen illustrated in fig. 237 [our fig. 275] is imperfect, a few inches of the base having been lost. The shape is rather more elegant than that of the other specimen, and the surface is neatly finished and polished. The ground color, or slip, is a warm yellow gray, and the decoration is in red and black. The rim, or upper margin, is rather rudely finished and is painted red, and on the exterior is made slightly concave and furnished with a raised band to facilitate the attachment of the head.

Rattles.—The instruments of this class from Chiriqui are gourd-shaped, and the majority are painted and decorated in the same manner as the whistles and other pottery objects from that



Fig. 276.

RATTLE OF PAINTED WARE.

Chiriqui.

Sixth Annual Report of the Bureau of Ethnology, fig. 233. Cat. No. 109628, U.S.N.M. $\frac{3}{4}$ natural size.

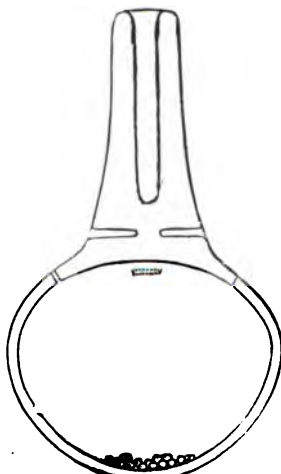


Fig. 277.

SECTION OF RATTLE SHOWN IN FIG. 276.



Fig. 278.

RATTLE OF PLAIN WARE SUBMOUNTED BY TWO GROTESQUE FIGURES.

Chiriqui.

Cat. No. 132761, U.S.N.M. $\frac{1}{2}$ natural size.

locality. There are slit-like openings on the upper part of the body, and the sound is produced by a number of small clay pellets inside. The handle is hollow in most cases, and probably served as a whistle. In some specimens the neck is perforated for suspension. The details of their construction are shown in figs. 276 and 277,¹ the latter a section drawing. The sounds produced are weak in comparison with the rattles of the modern Indian, but they may have occupied an important place in the ceremonies of a primitive people.

Specimen, Cat. No. 131437 (U.S.N.M.) is a rattle of plain ware with a solid handle. In fig. 278² is shown a rattle of plain ware. The

¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 157, figs. 233, 234.

² *Idem.*, fig. 235.

handle is represented as a separate piece lashed on with cords. On the upper end of the handle are two grotesque human figures standing back to back.

The following



Fig. 279.

BRONZE BELLS, PLATED OR WASHED WITH GOLD.

Chiriqui.

Cat. No. 74675, U.S.N.M. Natural size.



Fig. 280.

BRONZE BELL WITH HUMAN FEATURES.

Chiriqui.

Stearns Collection.

specimens are all gourd-shaped rattles of painted ware, similar in form and construction to fig. 276 (Cat. Nos. 109626, 109627, 109628, 109629, 109630, 109631, 109632, 109647, and 131436, U.S.N.M.).

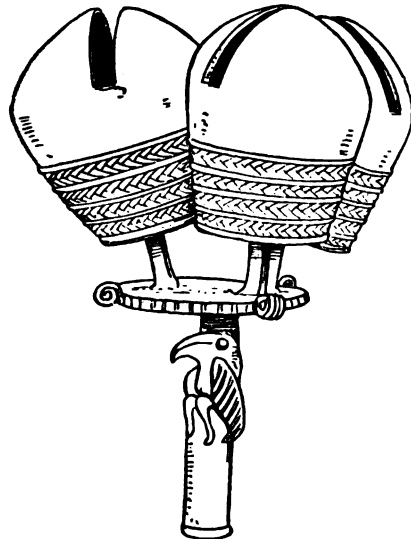


Fig. 281.

TRIPLE BELL OR RATTLE OF GOLD.

Chiriqui.

Stearns Collection.

METAL INSTRUMENTS.

Bronze bells.—The descriptions and illustrations here given of metallic objects are mostly taken from Mr. Holmes's paper.¹

Bells seem to have been in pretty general use by the more cultured American races previous to the conquest. The form best known is the hawk bell, or common sleigh bell of the North. The globular body is suspended by a loop at the top and is slit on the under side, so that the tinkling of the small free pellets of metal may be audible. Such bells are found in considerable numbers in the graves of Chiriqui, although I have no positive assurance that any of the examples in my possession were actually taken from graves which contained typical Chiriquian relics of other classes. The specimens now in the National Museum (fig. 41 [our fig. 279] are in most cases, if not in

all, of bronze, as determined by Mr. R. B. Riggs, of the chemical laboratory of the United States Geological Survey. All have been cast in molds. In most

¹Sixth Annual Report of the Bureau of Ethnology, 1884-85, pp. 49, 50, figs. 41, 42, 43.

cases there are traces of a plating of gold. The largest is $1\frac{1}{2}$ inches in height and three-fourths of an inch in diameter. It is surmounted by the rude figure of an animal, through or beneath the body of which is an opening or attachment of a cord. Others have simple loops at the top. The small perforated one belongs to



Fig. 282.

GOLD RATTLE.

Antioquia.

Cat. No. 14617, U.S.N.M.

Natural size.

Mr. J. B. Stearns, of Short Hills, New Jersey. The additional piece given in fig. 42 [our fig. 280] is unique in conception. It represents a human head, which takes an inverted position when the bell is suspended. The lower part of the bell forms a conical crown to the head and the ring of suspension is attached to the chin. Double coils of wire take the place of the ears, and the other features are formed by setting on bits of the material used in modeling. This specimen belongs to the collection of Mr. Stearns. Many examples of more elaborate workmanship have been recovered from the tombs and are now to be found in the collections of America and Europe. A specimen found many years ago on the Rio Grande near Panama, and figured in Harper's Weekly, was of gold and showed specific variations from the Chiriquian pieces. It will be seen by reference to the outline given in fig. 43 [our fig. 281] that three very neatly shaped and gracefully ornamented bells are mounted upon a circular plate to which a short

handle is attached. It was evidently not intended for suspension, but rather to be held in the hand as a rattle.

Fig. 282 represents a small gold rattle from a prehistoric grave in the province of Antioquia, Colombia, South America, received from Mr. Thomas Herran. The upper part is globular, and contains the metal pellet which produces the tinkling sound. The stem or handle is tapering and encircled by raised fillets. It was evidently cast in a mold. The tone is weak compared with that obtained from the bells made of bronze



Fig. 283.

DOUBLE WHISTLE.

Chiriqui.

U. S. National Museum. Natural size.

previously mentioned, the natural properties of gold not being as resonant.

WIND INSTRUMENTS—POTTERY.



Fig. 284.

SECTION OF DOUBLE WHISTLE,

FIG. 283.

Double whistles.—These are the simplest form and need not be described separately. They are all pear or gourd shaped, joined above and below, and have an opening between the necks. The mouthpieces are where the stems are joined, and are so close together that both must be blown at the same time. Two tones are produced, and in a

majority of the instruments these are identical in pitch. Where there is a difference it will be indicated in the accompanying scales. Fig. 283 represents one of this series, and the section in fig. 284 shows the relative positions of the mouthpieces, air passages,

ventholes, and chambers. These are reproduced from Mr. Holmes's paper.¹

The note produced is pitched very high and is extremely penetrating:



The following list gives the catalogue number and the pitch of the notes obtained from the whistles of this class in the Museum collection, which are not figured:²

Specimen, Cat. No. 109737 (U.S.N.M.), unpainted ware:



Specimen, Cat. No. 131948 (U.S.N.M.), unpainted ware:



Specimen, Cat. No. 109719 (U.S.N.M.), unpainted ware, mutilated. Only one side will produce a tone:



Specimen, Cat. No. 75550 (U.S.N.M.), painted dull red color:



Specimen, Cat. No. 109678 (U.S.N.M.), painted dull red color. Only one side will emit a note, the venthole on the opposite side being broken:



Specimen, Cat. No. 132756 (U.S.N.M.), painted dull red:



¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 161, figs. 239, 240.

² The notes given by these double whistles should read an octave higher than indicated on the staff.

Specimen, Cat. No. 132727¹ (U.S.N.M.), painted dull red color.
Difference of a semitone between the two sides:



Specimen, Cat. No. 132758¹ (U.S.N.M.), painted dull red color:



Specimen, Cat. No. 133465¹ (U.S.N.M.), painted dull red color:



Specimen, Cat. No. 131945¹ (U.S.N.M.), painted dull red color:



Specimen, Cat. No. 131946¹ (U.S.N.M.), painted, decoration in black on red ground. Lost color ware. Difference of a tone between the two sides:



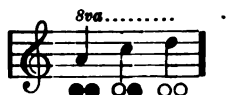
Specimen, Cat. No. 131947¹ (U.S.N.M.), painted, decoration in black on red ground. Lost color ware:



Bird-shaped whistles of unpainted ware.—In fig. 285 is presented one of this class. The body is short and wide, with the wings spread. Its long neck terminates in a triangular-shaped head, with protruding eyes upon the top. There are two finger holes in the breast, and the tail

¹ See note 2, p. 629.

serves for a mouthpiece, as is usual in the bird-shaped instruments. Three notes are possible, as follows:



The lower note is obtained with both holes closed, the upper one with both open, and the middle tone with either, no matter which, closed. Unless otherwise stated, this is true of all the bird-shaped whistles with two finger holes.

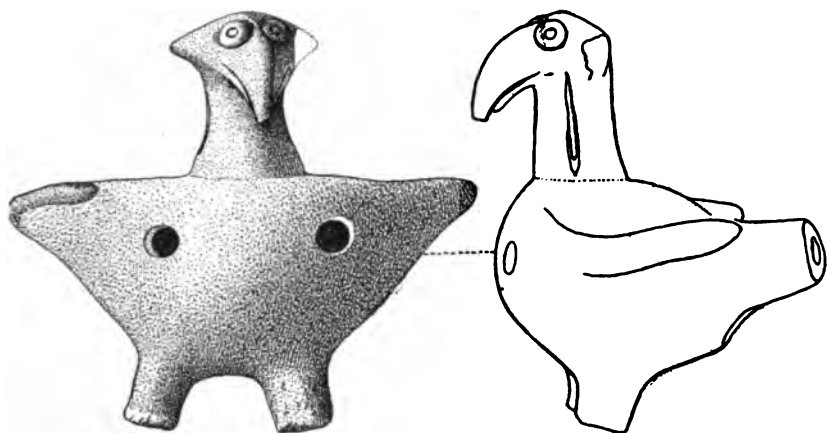


Fig. 285.

BIRD-SHAPED WHISTLE, UNPAINTED WARE.

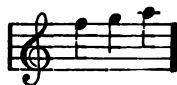
Chiriqui.

Cat. No. 109708, U.S.N.M. $\frac{3}{4}$ natural size.

Specimen, Cat. No. 131941 (U.S.N.M.) is a smaller whistle of the same general character. There are two finger holes in the breast, making the compass of the instrument three notes:



Specimen, Cat. No. 109662 (U.S.N.M.) is in principle the same as the preceding. The difference in musical tones will be seen in the accompanying scale:



Bird-shaped whistles, colored red, without painted decorations.—The whistles in this group need not be described individually. They are all bird shaped, varying in size, slip-washed red and without decorations. There are two finger holes in the breast of each. Three notes

can be obtained from all; the lower when both sound holes are stopped, the next higher with one stop, and the upper note with both holes open. The second or middle note is the same whether stopped on one side or the other. Fig. 286 represents one of the series. Its three notes are as follows:



The following list gives the catalogue number and the accompanying scales the notes emitted by whistles with two holes not figured.

Specimen, Cat. No. 109672 (U.S.N.M.):



Specimen, Cat. No. 132755 (U.S.N.M.):



Fig. 286.

BIRD-SHAPED WHISTLE, COLORED RED.

Chiriqui.

Cat. No. 131938, U.S.N.M. $\frac{3}{4}$ natural size.

Specimen, Cat. No.
109665 (U.S.N.M.):



Specimen, Cat. No.
109666 (U.S.N.M.):



Specimen, Cat. No.
109649 (U.S.N.M.):



Fig. 287.

BIRD-SHAPED WHISTLE, PAINTED DECORATION.

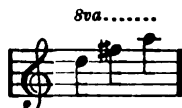
Chiriqui.

Cat. No. 109656, U.S.N.M. Natural size.

Specimen, Cat. No. 109711 (U.S.N.M.), mutilated, tones indistinct.
Specimen, Cat. No. 109658 (U.S.N.M.), mutilated.

Bird-shaped whistles with painted decorations.—The air passages, sound holes, etc., are the same as in the whistles just described. A short description of the decorations, which refer more or less to the markings of the plumage, and a scale indicating the musical capacity will accompany each number. In all specimens the neck (of the bird) is pierced for a suspension hole.

An example of this class is shown in fig. 287, which is reproduced from Mr. Holmes's paper.¹ The ground color is yellow. The neck, tail, and underpart of the body are painted red, and band decorations in black pass around the front and upper surface. (Lost color ware.) The following notes are emitted:



Specimen, Cat. No. 109671 (U.S.N.M.). Small whistle, dark yellow ground with a broad stripe of red on the breast and lower part of the body. Its three notes are as follows:



Specimen, Cat. No. 131939 (U.S.N.M.). Small whistle. Pale red ground color with traces of decoration in black. Three notes:



Specimen, Cat. No. 109661 (U.S.N.M.). Small whistle. Red ground color with black decoration. Three notes as follows:



Specimen, Cat. No. 133464 (U.S.N.M.). Small whistle. Dark yellow ground color. Breast and lower part of body painted red. Three notes:



Specimen, Cat. No. 131940 (U.S.N.M.). Small whistle. Dark yellow ground color, with traces of decoration in black. Three notes:



Specimen, Cat. No. 75549 (U.S.N.M.). Small whistle. Grayish yellow ground color, with red and black decoration. Three notes, as follows:



Specimen, Cat. No. 109674 (U.S.N.M.). Small whistle. Pale yellow

¹Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 168, fig. 253.

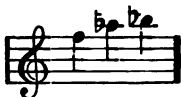
ground color, with traces of decoration in black or brown. Three notes:



Specimen, Cat. No. 109713 (U.S.N.M.). Ground color, pale brown. The upper part of the body is deep red, and there are line decorations in red and black on the tail. The whole surface is polished. Its three notes are here indicated:



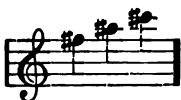
Specimen, Cat. No. 106669 (U.S.N.M.). The lower part of the body is painted red; the upper part pale yellow. Decoration in black of conventional designs on all surfaces. Three notes, as follows:



Specimen, Cat. No. 109652 (U.S.N.M.). The head, breast, and lower part of the body are painted red. The upper part of the body is pale yellow, upon which are decorations in black. Its three notes are here indicated:



Specimen, Cat. No. 109663 (U.S.N.M.). The body is painted red, the head and neck grayish yellow, and there are traces of ornamentation in black. Three notes, as follows:



Specimen, Cat. No. 131936 (U.S.N.M.). The ground color is dark red, and the decorations in black are much obliterated. Its three notes are indicated in the accompanying scale:



Fig. 288 represents one of the large bird-shaped specimens. The cut is reproduced from Mr. Holmes's paper,¹ and his description follows:

The piece given in fig. 254 [our fig. 288] has the shape and markings of a hawk or eagle. It belongs to the alligator ware and is elaborately finished in semi-geometric devices in red and black.

¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 169, fig. 254.

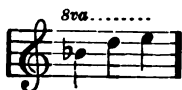
Its three notes are here indicated:



Specimen, Cat. No. 109710 (U.S.N.M.). The decorations, which are well preserved, are in black and red on pale yellow ground. Three notes are emitted:



Specimen, Cat. No. 131937 (U.S.N.M.). The body is painted red, the head and neck yellow, and there are traces of decoration in black. The two upper notes are indistinct on account of a fracture in the mouthpiece.



Specimen, Cat. No. 109709 (U.S.N.M.) represents an owl. The ground color is gray and the decorations are conventional devices in red and brown. Three notes:



Specimen, Cat. No. 131935 (U.S.N.M.) represents a parrot. The ground color is gray and the decoration quite simple, consisting of lines and dots in red and black. Its three notes are indicated in the accompanying scale:



Specimen, Cat. No. 1167 (U.S.N.M.), also from Chiriqui, was presented by Col. E. Jewett. It is parrot shaped, and the decorations are conventional devices in red and black on yellow ground. Its three notes are as follows:



Fig. 288.

BIRD-SHAPED WHISTLE, CONVENTIONAL DECORATION IN BLACK AND RED.

Chiriqui.

Cat. No. 109712, U.S.N.M. Natural size.

In fig. 289 is shown a small double whistle representing two birds with their bodies joined together. The tails form a mouthpiece with the air passages close together, as are the small pear-shaped whistles heretofore described. The decoration is simple, consisting of a few black lines on the body and the beak or bill painted red. There are two finger holes, one on the outside of each body. When these are closed a tone is produced a major third below that given when



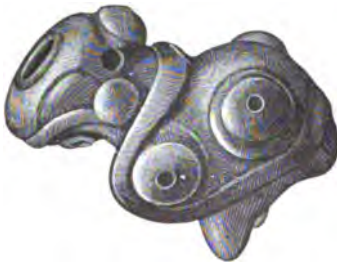
Fig. 289.
DOUBLE WHISTLE, TWO BIRDS.
Chiriqui.
Cat. No. 133467, U.S.N.M.
Natural size.



open. The notes are in unison, extremely shrill and piercing.

Animal-shaped whistles.—In fig. 290 *a, b*, are shown two views of a small animal-shaped whistle of dark clay. These are reproduced from Mr. Holmes's paper,¹ and in describing two specimens of this class he says:

Two little instruments of remarkable form and unusual powers stand quite alone among their fellows. One only is entire. It is made of dark clay, and represents a creature not referable to any known form, so completely is it conventionalized. A fair idea of its appearance can be gained from figs. 243 and 244 [our figs. 290 *a, b*].



a

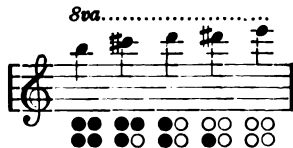


b

Fig. 290.
ANIMAL-SHAPED WHISTLE OF BLACKISH WARE.
Chiriqui.

Cat. No. 109732, U.S.N.M. Natural size.

The first gives the side view and the second the top view. The mouthpiece is in what appears to be the forehead of the creature. The venthole is beneath the neck, and there are four minute finger holes, one in the middle of four flattish nodes, which have the appearance of large protruding eyes. A suspension hole passes through a node upon the top of the head. The capacity of this instrument is five notes, clear in tone and high in pitch. It is notable that the pitch of each stop when open alone is identical, the holes being exactly the same size.



¹Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 162, figs. 243, 244.

In playing it does not matter in what order the fingers are moved. The lower note is made with all the holes closed, and the ascending scale is produced by opening successively one, two, three, and four holes. The fragmentary piece [Cat. No. 109741, U.S.N.M.] is much smaller and the holes are extremely small.

Specimen, Cat. No. 133463 (U.S.N.M.) is a small, monkey-shaped whistle of painted ware. The ground color is light red, and the decorations consist of black and dark red lines and dots. The animal is represented in a squatting position, with its long tail curved upward and attached to the back of the neck. The mouthpiece is in the tail, and there are two finger holes, one on each shoulder. Six notes can be obtained—three with normal force in blowing:



and three by using more force, thus:



Specimen, Cat. No. 109723 (U.S.N.M.) is a semihuman figure of plain red polished ware. The egg-shaped body is supported by two short legs, one of which serves as a mouthpiece. The left arm is raised to the head; the right is placed akimbo. A long tail curves up the back. The two sound holes are placed one in front and the other in the rear of the left shoulder. Its three notes are here given:



Specimen, Cat. No. 109655 (U.S.N.M.) represents a puma. It is of painted ware, and the ground color is yellow. Conventional decorations in black represent the skin markings of the animal. There are two finger holes, one on each fore shoulder, and the tail serves as a mouthpiece. Its three notes are as follows:



Fig. 291 represents a cat-shaped whistle of painted ware. Mr. Holmes, in describing this specimen,¹ says:

The mouthpiece is in the tail, and one of the sound holes is in the left shoulder and the other beneath the body. The head is turned to one side and the face is decidedly cat-like in expression. The decoration is in black and red, and may be taken as a typical example of the conventional treatment of the markings of the bodies of such

¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 167, fig. 251.



Fig. 291.

CAT SHAPED WHISTLE OF PAINTED WARE.

Chiriqui.

Cat. No. 109467, U.S.N.M. Natural size.



Fig. 292.

WHISTLE WITH FOUR OCELOT-LIKE HEADS.

Chiriqui.

Cat. No. 139761, U.S.N.M. Natural size.

animals. The tips of the ears, feet, and tail are red. Rows of red strokes, alternating with black, extend in a broad stripe from the point of the nose to the base of the neck. Red panels, inclosing rows of red dots and enframed by black lines, cross the back. On the sides we have oblong spaces filled in with conventional devices so common in other animal representations. The legs are striped and dotted after the usual manner.

Its three notes are as follows:



In fig. 292 is shown a painted whistle with four ocelot-like heads. This is reproduced from Mr. Holmes's paper (p. 168, fig. 252), and his description in part is here given:

The instrument consists of an oblong body, to which four ocelot-like heads are fixed, one at each end and the others at the sides. It rests upon four feet, in one of which the mouthpiece is placed. The finger holes are in the side of the body, near the legs, as seen in the cut. The decoration, which consists of more or less conventional representations of the skin markings of the animal, is in black and red.

Its notes are three, as follows:

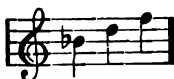


Fig. 293 represents an alligator-shaped whistle of painted ware. This is the largest specimen in the collection, and Mr. Holmes, in speaking of it (p. 166, fig. 250), says:

The air chamber is large, and the sounds emitted are full and melodious and are lower in pitch than those of any other instrument in the collection. The cavity in the mouth and head is separated from the body chamber, and, with the addition of earthen pellets, probably served as a rattle. The mouthpiece is in the tail and the finger holes are in the sides of the body.

Its three notes are shown in the accompanying scale:



ALLIGATOR-SHAPED WHISTLE OF PAINTED WARE.
Fig. 293.
Chipiqui.
Cat. No. 18870, U.S.N.M. ‡ natural size.

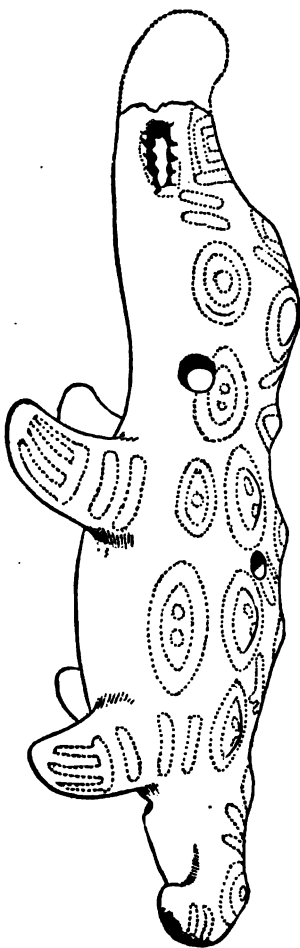


Fig. 294 presents a back view of a crab-shaped instrument. Mr. Holmes¹ says of this:

On the opposite side are four small conical legs, upon which the object rests as does a vase upon its tripod. The mouthpiece is in the right arm, beneath which

is the venthole. The two finger holes are in the back, behind the eyes of the creature, and a suspension hole is seen in the left arm. The painted designs are in red and black lines upon a yellowish-gray ground.

The following scale indicates its capacity:



Specimen, Cat. No. 109742 (U.S. N.M.) is an animal-shaped whistle of unpainted ware. The mouthpiece is missing; conse-

quently no sound can be produced. There are two finger holes on the back, one on each side over the fore shoulders.

Whistles of complex form.—In this group are a number of instruments in which bird, animal, and other forms are combined. The division is purely arbitrary and only made for convenience of description. Fig. 295 represents one of the series. It is painted a dull red color, without decoration, and the whole surface is polished. The body and feet are of the conventional bird shape, the head being somewhat cat-like. In the place of wings are two feet or arms, one raised to the mouth and the other placed back of the left ear. The tail, which serves as a mouthpiece, is curled over the back and attached to the body below the neck. There are two sound holes in the breast. One of

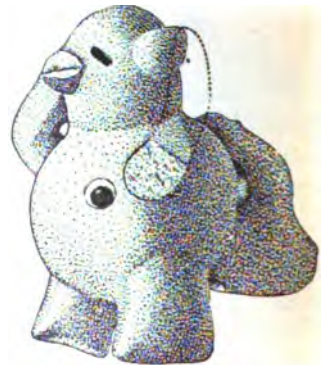
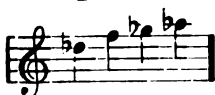


Fig. 295.
WHISTLE, COMPLEX FORM.
Chiriqui.

Cat. No. 109660, U.S.N.M. $\frac{2}{3}$ natural size.

¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 165, fig. 249.

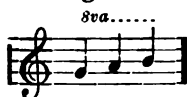
these being larger than the other, either by accident or design, adds one note to its scale, which is here given:



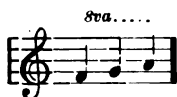
Specimen, Cat. No. 109668 (U.S.N.M.) is a small whistle, partly animal and partly bird in shape. It is of plain red ware with polished surfaces. The tail serves as a mouthpiece, and there are two sound holes in the breast. Its three notes are as follows:



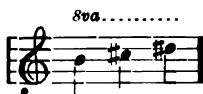
Specimen, Cat. No. 109651 (U.S.N.M.) has a bird-like body with an animal head. The face, breast, and under part of the body is painted a dull red color. The upper is pale yellow, upon which are traces of a band decoration in black. There are two sound holes in the breast, and the notes emitted are indicated in the following scale:



Specimen, Cat. No. 131942 (U.S.N.M.) is an exceedingly grotesque form. The body is bird-shaped with a monkey-like head and fore feet. One of these grasps the tail and the other is held to the mouth. The decoration is in black and red on yellow ground. There are two finger holes, one beneath the left fore leg or arm, the other on the back. The tail serves as a mouthpiece, and the notes obtained are given in the accompanying scale:



Specimen, Cat. No. 133461 (U.S.N.M.) is also a combination of animal and bird forms. The decoration is in red and black lines and dots on yellow ground. There are two sound holes in the breast. Its three notes are here given:



In fig. 296 is presented a curious form of whistle. The lower part of the instrument is bird-shaped, and standing transversely across the

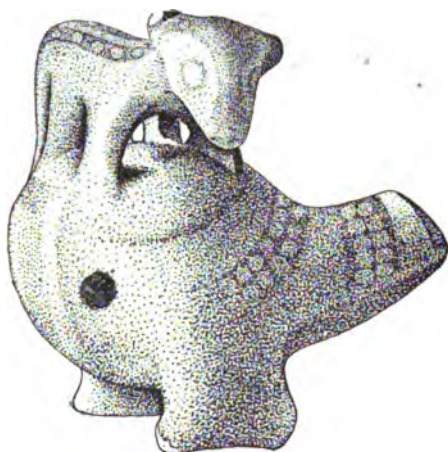


Fig. 296.

WHISTLE, COMPLEX FORM.

Chiriqui.

Cat. No. 109650, U.S.N.M. $\frac{3}{4}$ natural size.

body is the figure of an animal (puma?). The body of the bird is dull red in color, with traces of decoration in black. Upon the animal, which is painted grayish yellow, are the conventional representations of skin markings in black. There are two finger holes in the breast of the bird, and its tail forms a mouthpiece. Its notes are given in the accompanying scale:

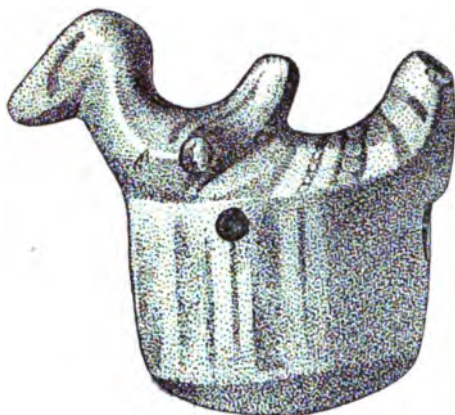


Fig. 297.

WHISTLE, COMPLEX FORM.

Chiriqui.

Cat. No. 133448, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 297 represents an instrument having somewhat the appearance of a small covered dish with a prolongation for a handle, which serves as a mouthpiece. Upon the top or

cover is the figure of a bird. The ground color of the dish or air chamber is red and that of the bird figure pale yellow. Upon both are line decorations in black. There are two sound holes near the upper edge opposite the mouthpiece. Its three notes are as follows:



Specimen, Cat. No. 133449 (U.S.N.M.) The body of this instrument is similar to the one just described (fig. 297). It is painted dull red and polished. A grotesque figure with an animal-like head is attached to the upper part. There are two finger holes on the side opposite the mouthpiece. Three notes are emitted:



Specimen, Cat. No. 133450 (U.S.N.M.). The outline of this whistle is the same as the preceding (fig. 297), but having the head of a reptile (?) on the upper part opposite the handle or mouthpiece. The

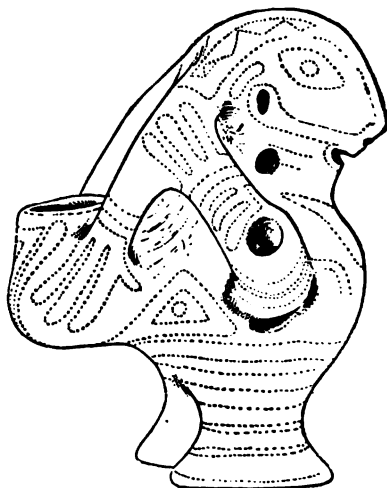


Fig. 298.

WHISTLE, GROTESQUE FORM.

Chiriqui.

Cat. No. 109729, U.S.N.M. $\frac{1}{2}$ natural size.

ground color is pale red, and there are traces of line decoration in black. There are two sound holes, and its three notes are indicated in the following scale:



Specimen, Cat. No. 109714 (U.S.N.M.) is a small whistle of the same class. Upon the upper part is the figure of a bird with a suspension hole passing through the body. The color is dark red without decoration, and all surfaces are polished. There are two sound holes, and its three notes are here given:



Whistles in grotesque forms.—In this series are placed a limited number of instruments from Chiriqui, in which the human figure is represented. Mr. Holmes,¹ in speaking of these objects, says:

The human figure was occasionally utilized. The treatment, however, is extremely rude and conventional, the features having the peculiar squirrel-like character shown in the figurines already given. The unique piece given in fig. 256 [our fig. 298] represents a short, clumsy female figure with a squirrel face, carrying a vessel upon her back by means of a head strap, which is held in place by the hands. The mouthpiece of the whistle is in the right elbow and one sound hole is in the middle of the breast and the other in the left side. The costume and some of the details of anatomy are indicated by red and black lines in the original.

Its three notes are as follows:



Specimen, Cat. No. 109659 (U.S.N.M.) is a painted whistle representing a female. The ground color is light red, the mouth, arms, and knees being outlined with stripes of darker color. The body is short and broad, with stumpy legs set wide apart, and the arms are attached to the body in relief. The hollow head contains a small clay pellet, which produces a rattling sound. A prolongation of the left shoulder serves as a mouthpiece. There are two finger holes beneath the right shoulder, one on the breast and the other nearly opposite on the back. Its three notes are indicated in the accompanying scale:



An instrument similar in form to the statuettes figured and described

¹Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 170, fig. 256.

by Mr. Holmes¹ is presented in fig. 299. It represents a female figure in a sitting position. The ground color is yellow and the painted designs in black and red, indicating some of the details of costume, are much obliterated. The mouthpiece is in the left shoulder, and there are two sound holes, one above the right breast, the other near the center of the body. Its three notes are here given:

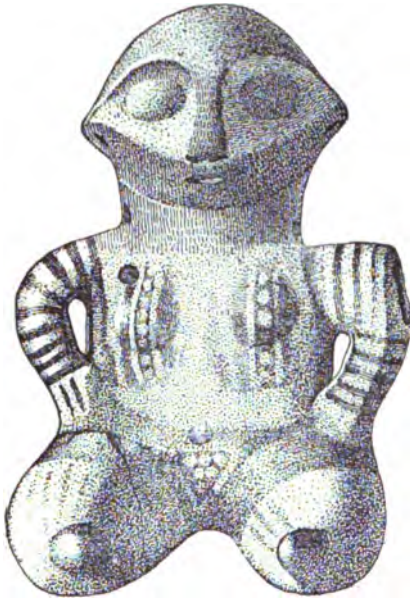


Fig. 299.

WHISTLE REPRESENTING FEMALE FIGURE.
Chiriqui.

Cat. No. 109706, U.S.N.M. $\frac{3}{4}$ natural size.

and the right is raised to the mouth. The ground color is yellow and the painted decoration quite simple, two bands of red encircling both the upper and lower portions of the body. There are two sound holes in the breast. A mouthpiece which protruded from the back is missing, consequently its former musical capacity is unknown.

Fig. 300 represents a small grotesque figure of painted ware. A good idea of its shape can be obtained from the sketch. The painted decoration is in purple and red, upon a ground color of grayish yellow. The left arm is raised to the head and has an aperture at the elbow which serves as a mouthpiece. The right arm is folded across the center of the body in front. There are two finger holes, one below the right shoulder, the other

Specimen, Cat. No. 131435 (U.S.N.M.) is a grotesque figure in a standing position. The legs are extremely short and the large, triangular-shaped head is out of proportion to the size of the body. The left arm rests against the side

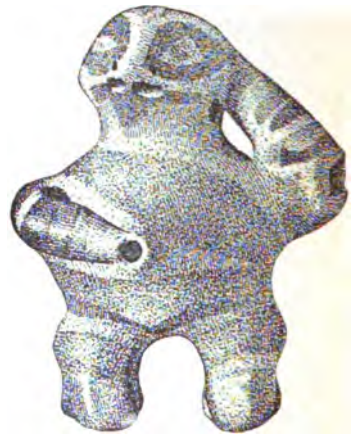


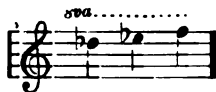
Fig. 300.

WHISTLE, GROTESQUE FORM.
Chiriqui.

Cat. No. 131943, U.S.N.M. $\frac{1}{10}$ natural size.

¹Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 151.

passing through the right hand where it is laid against the body. Its three notes are as follows:



Drum-shaped whistles.—In addition to the various forms which have been described there are a number of shapes copied from other musical instruments. An interesting example is shown in fig. 301. The cut is reproduced from Mr. Holmes's paper,¹ and in speaking of this class of objects he says:

A very interesting specimen, illustrated in fig. 247 [our fig. 301], modeled in imitation of a drum, has not only the general shape of that instrument, but the skin head, with its bands and cords of attachment, is truthfully represented. A curious conceit is here observed in association of the bird—a favorite form for the whistle—with the drum.

A small figure of a bird extends transversely across the body of the drum cham-

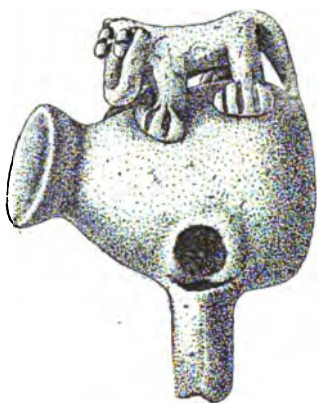


Fig. 302.

DRUM-SHAPED WHISTLE OF PLAIN WARE, GROTESQUE ANIMAL FIGURE ATTACHED.

Chiriqui.

Cat. No. 109720, U.S.N.M. $\frac{1}{2}$ natural size.



Fig. 301.

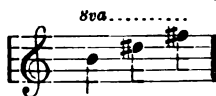
DRUM-SHAPED WHISTLE OF PLAIN WARE, BIRD FIGURE ATTACHED.

Chiriqui.

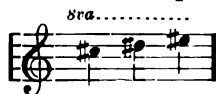
Cat. No. 109721, U.S.N.M. Natural size.

ber, the back being turned from the observer in the cut. The tail serves for a mouthpiece, while the finger holes are placed in the breast of the bird, the position usually assigned them in simple bird whistles.

Its three notes are indicated in the accompanying scale:



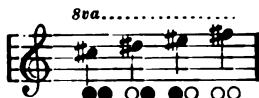
Specimen, Cat. No. 109718 (U.S.N.M.) is a plain drum-shaped whistle of unpainted ware. A prolongation on one side forms the mouthpiece, and there are two finger holes. The compass of the instrument is three notes, as follows:



Another drum-shaped whistle belonging to the unpainted group is shown in fig. 302. On the side opposite the mouthpiece is attached a

¹Sixth Annual Report of the Bureau of Ethnology, 1884-85, p. 165, fig. 247.

grotesque animal-shaped figure. There are two sound holes, and one being slightly larger than the other adds a note to the compass of the instrument, as indicated in the accompanying scale:



Specimen, Cat. No. 109673 (U.S.N.M.) is a small whistle painted grayish yellow. A prolongation at the upper part, or drumhead, forms the mouthpiece. There are two finger holes, one on each side of the air chamber. Its three notes are as follows:

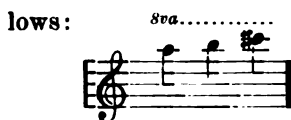


Fig. 303 represents a painted



Fig. 303.

DRUM-SHAPED WHISTLE OF PAINTED WARE.
Chiriqui.

Cat. No. 131944, U.S.N.M. $\frac{1}{2}$ natural size.

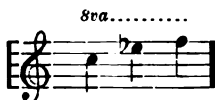


Fig. 304.

TOP-SHAPED INSTRUMENT WITH THREE FINGER HOLES.
Chiriqui.

Cat. No. 109692, U.S.N.M. Natural size.

instrument with the same general outline as the preceding. The ground color is dark brown and there are traces of line or band decoration in red. A prolongation on one side of the air chamber forms the mouthpiece, and there are two finger holes on the opposite side. A raised fillet or loop on the surface between the mouthpiece and sound holes serves for a suspension hole. The tones emitted are round and full, and are indicated in the following scale:



Top-shaped whistles.—There are in the collection two instruments of this form. The size and details of construction are shown in figs. 304

and 305. The cuts are reproduced from Mr. Holmes's paper,¹ and his description is here given in full:

Of a distinct type of form, although involving no new principle of construction, are two top-like or turnip-shaped instruments, one of which is shown in fig. 245 [our fig. 304]. The form is symmetrical, the ornamentation tasteful, and the surface highly polished. The ware is of the alligator group and is decorated in red and black figures. A section is given of 246a [our fig. 305] and the top and bottom views in *b* and *c*. By reference to these a clear conception of the objects can be formed.

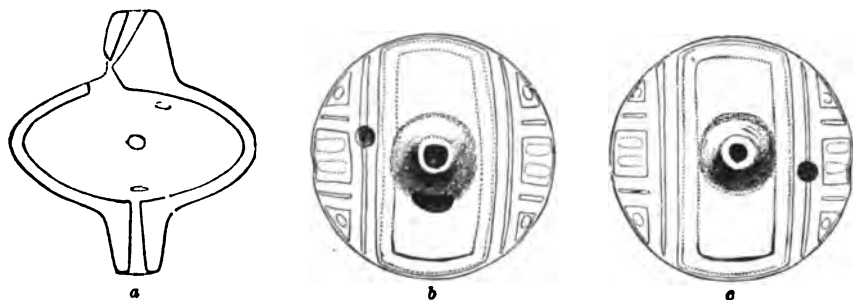


Fig. 305.

SECTION AND VERTICAL VIEWS OF INSTRUMENT SHOWN IN FIG. 304.

The companion piece [Cat. No. 109681, U.S.N.M.] is identical in size, shape, and conformation, and, strange to say, in musical notes also. The tones are not fixed, as each can be made to vary two or three degrees by changing the force of the breath. The tones produced by a breath of average force are indicated as nearly as may be in the accompanying scale:



They will be found to occur nearer the lower than the upper limit of their ranges. It should be observed that the capacity for variation possessed by each of these notes enables the skilled performer to glide from one to the other without interruption. This instrument is, therefore, within its limited range as capable of adjusting itself to any succession of intervals as is the trombone or the violin. I do not imagine, however, that the aboriginal performer made any systematic use of this power or that the instrument was purposely so constructed. It will be seen by reference to the scale that stopping the orifice in the end opposite the mouthpiece changes the notes half a tone, or perhaps, if accurately measured, a little less than that.

Specimen, Cat. No. 132754 (U.S.N.M.) is a smaller whistle, somewhat like the preceding in outline. The lower projection opposite the mouthpiece is, however, closed, and there are but two sound holes. The following notes are emitted:



¹Sixth Annual Report of the Bureau of Ethnology, 1884-85, pp. 163, 164, figs. 245, 246.

Tubular or reed-shaped instruments.—The whistling mechanism corresponds to that of other forms. The chamber is tubular and the lower end open. Specimen, Cat. No. 109717 (U.S.N.M.) is a tube of painted ware without finger holes. The ground color is yellow, and there are



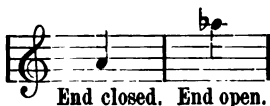
Fig. 306.

TUBULAR INSTRUMENT WITH TWO FINGER HOLES.

Chiriqui.

Cat. No. 109680, U.S.N.M. Natural size.

bands of red at each end and one midway between. With ordinary force in blowing, two notes nearly an octave apart are obtained—the lower with the end closed and the higher one with the end open:



By using greater force in blowing, the following note is emitted:



In fig. 306 is shown a tubular instrument with two finger holes. Fig. 307 is a section of the same. The cuts are reproduced from Mr. Holmes's paper,¹ and his description is here given:

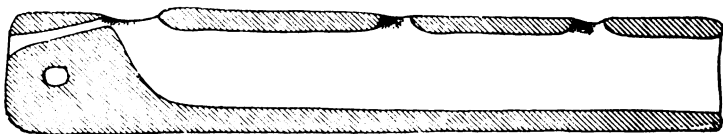


Fig. 307.

SECTIONAL VIEW OF FIG. 306.

Perhaps the most satisfactory instrument in the whole collection, so far as range is concerned, is shown in fig. 241 [our fig. 306], and a section is given in fig. 242 [our fig. 307]. It is capable of yielding the notes indicated in the accompanying scale: First a normal series of eight sounds, produced as shown in the diagram; and, second, a series produced by blowing with greater force, one note two octaves above

¹ Sixth Annual Report of the Bureau of Ethnology, 1884-85, pp. 161, 162, figs. 241, 242.

its radical, and the others three octaves above. These notes are difficult to produce and hold, and were probably not utilized by the native performer



Specimen, Cat. No. 133467 (U.S.N.M.). This instrument is identical with the preceding in shape, and also has two finger holes. The body is painted yellow and there are band decorations in red. With the end hole opened, the following notes can be obtained:



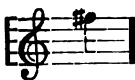
Closing the end and blowing with greater force will give two additional tones as seen in the accompanying scale:



The note F# is emitted with either hole stopped or with both holes open.

ECUADOR.

Specimen, Cat. No. 195590 (U.S.N.M.) represents an animal-shaped whistle from La Plata Island, Ecuador. It is rudely modeled in coarse gray-colored clay. The whistling device is placed at the back of the neck, where the hollow interior is divided by a thin partition. In this arrangement the head serves as an air chamber and the body a mouth-piece. Its one note, F#, is here given:



BRITISH GUIANA.

Rattles, flutes, and trumpets.—The musical instruments in the Museum obtained from British Guiana can not properly be classed as prehistoric. It was thought, however, that descriptions of a few primitive instruments belonging to still existing tribes might prove interesting. It appears that only a limited variety of instruments are known to these people. Rattles and whistles or flutes made of different material seem

to have been all that can be so classed. Fig. 308, collected by W. C. McClintock, represents a rattle (*shak-shak*), made of thin strips of cane



Fig. 308.

RATTLE (*shak-shak*) MADE
OF PLAITED STRIPS OF
CANE.

Carib Indians, British
Guiana.

Cat. No. 54186, U.S.N.M.
 $\frac{1}{2}$ natural size.

about one-eighth of an inch wide, and woven or plaited as in making baskets. At the lower end the strips are drawn together and lashed around a small spindle of wood with a cord of grass fiber, which forms the handle. The strips are of two colors, alternating as they are woven. The inside is furnished with small pebbles or seeds, which produce the rattling sound. This sound, however, is quite feeble, owing to the nature of the material which forms the chamber. A similar instrument in the Haldeman collection, Museum of Academy Natural Sciences, Philadelphia, is labeled as from the Carib Indians, British Guiana.

Specimen, Cat. No. 5374 (U.S.N.M.), presented by J. Varden, is a rattle made of a round gourd. It is painted dark brown and has four narrow slits or incisions about 4 inches long—two vertical and two horizontal—on opposite sides. A number of small pebbles inside produce the sound when shaken. A piece of wood $29\frac{1}{2}$ inches long passes through the gourd and extends 15 inches beyond the upper part. The lower end or handle proper projects $11\frac{1}{2}$ inches. The upper end is wrapped with a piece of flat sinnet made of cotton cord, to loops in which are attached bright-colored feathers of the parakeet. An instrument from British Guiana identical with the foregoing is figured and described by Mr. J. G. Wood.¹

In fig. 309 is presented a flute (*Wat-sa-pua*) or flageolet made from the thigh bone of the South American panther or jaguar. It is ornamented with incised bands and lines. The upper end is cut off square and

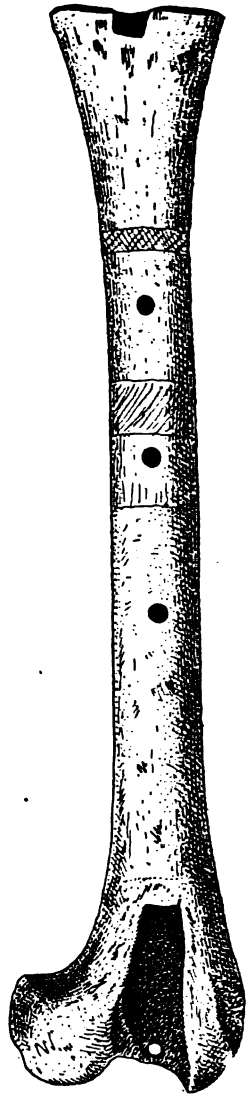


Fig. 309.

BONE FLUTE OR FLAGEOLET
(*wat-sa-pua*).

British Guiana.

Cat. No. 4346, U.S.N.M.
 $\frac{1}{2}$ natural size.

¹ Wood, J. G., The Natural History of Man, pp. 628, 629.

partly filled with resin to form the mouthpiece. It will be seen that the edge of the bone is cut out to form a sort of venthole. There are three finger holes and its musical capacity is shown in the accompanying scale:



This instrument is rather difficult to manipulate, and I was unable to obtain other notes by a different system of fingering. Gift of E. S. Brotherson.

A similar instrument with the same name is in the museum, Academy Natural Sciences, Philadelphia, from British Guiana, with a reference to "Brett's Indian tribes."



Fig. 310.

TRUMPET (1) OF POTTERY.
British Guiana.

Cat. No. 59603, U.S.N.M. $\frac{1}{2}$ natural size.



Fig. 311.

TRUMPET (2) OF POTTERY.
British Guiana.

Cat. No. 4361, U.S.N.M. $\frac{3}{4}$ natural size.

Fig. 310 represents one of two small instruments of pottery from British Guiana presented to the museum by Col. Philip Figyelmesy. It has a vase-shaped outline with an aperture at the small end for a mouthpiece. The ware is soft and fragile. Upon a ground color of silver-gray are painted designs in black. Attached to the larger end are six tassels made of cotton cord which has been dyed brown. The label attached to one of these specimens reads as follows: "Earthen pipe used for blowing a noise during native dances."

Fig. 311 represents a larger instrument of the same class, but with a

the South American Indians, evidently refers to this class. His description is here given:

Several of these barbarous contrivances scarcely deserve to be classed with musical instruments. This may, for instance, be said of certain musical jars or earthen vessels producing sounds, which the Peruvians constructed for their amusement. These vessels were made double, and the sounds imitated the cries of animals or birds. A similar contrivance of the Indians in Chile, preserved in the museum at Santiago, is described by the traveler S. S. Hill as follows: "It consists of two earthen vessels in the form of our india-rubber bottles, but somewhat larger, with a flat tube from 4 to 6 inches in length uniting their necks near the top and slightly curved upward, and with a small hole on the upper side one-third the length of the tube from one side of the necks. To produce the sounds the bottles were filled with water and suspended to the bough of a tree, or to a beam, by a string attached to the

middle of the curved tube, and then swung backward and forward in such a manner as to cause each end to be alternately the highest and lowest, so that the water might pass backward and forward from one bottle to the other through the tube between them. By this means soothing sounds were produced which, it is said, were employed to lull to repose the drowsy chiefs who usually slept away the hottest hours of the day. In the meantime, as the bottles were porous, the water within them diminished by evaporation, and the sound died gradually away."



Fig. 313.

WHISTLING VASE, PAINTED WARE, ONE CHAMBER.

Peru.

Cat. No. 1398, U.S.N.M. $\frac{2}{3}$ natural size.

The remarks in the quotation regarding the production of sound, i. e., by partially filling the bottles with water and swinging them back and forth, applies equally as well to the vessels in the museum collection. This has been demon-

strated by experiment. The musical notation of these instruments (?) has, however, as before stated, been obtained by blowing in the open neck. Perhaps, as Engel says, they "scarcely deserve to be classed with musical instruments."

Fig. 313 represents a vessel of painted ware with one chamber, collected by Admiral Charles Wilkes, United States Exploring Expedition. The ground color is dark yellow, upon which is laid in narrow stripes a red pigment of sufficient body to produce a slight relief effect. The spout or neck rises from one side of the vessel, and a handle curves from it to a projection opposite, representing a human figure sitting cross-legged. The handle is enlarged near where it joins the figure and forms an air chamber, which has a small opening, with the upper edge made thin and sharp. Opposite to this opening is a narrow slit

connecting with the interior of the vessel, through which a current of air is forced when blowing in the neck. The notes emitted are as follows:



The half tone difference is produced by using more force in blowing.

Specimen, Cat. No. 17382 (U.S.N.M.) is a one-chambered bottle of polished black ware from Peru, collected by Mr. J. V. Norton. The spout or neck is joined by a curved handle to a projection represent-



Fig. 314.

DOUBLE WHISTLING VASE, PAINTED WARE, PARROT.

Peru.

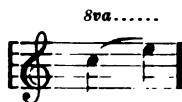
Cat. No. 89263, U.S.N.M. $\frac{2}{3}$ natural size.

ing a grotesque human figure. The handle is enlarged to form the whistling mechanism in the same manner as shown in fig. 313. Its two notes are as follows:



In fig. 314 (received from Mr. W. W. Evans) is presented a double vase of painted ware. One portion represents a parrot, the other is bottle-shaped, and the two are connected by a curved handle. The decorations

are in pale yellow and brown upon light-red ground color. The whistle is inside the head of the parrot. Its two notes are here given:



In this specimen the faintest increase or strength of breath will change the note from C to E, without giving, however, any intermediate sound. The result is a warbling, bird-like effect.¹

Specimen, Cat. No. 32258 (U.S.N.M.), from Peru, received from Mr. W. W. Evans, is a double bottle of dark-brown color without painted decoration. The mouth of the bottle is connected by a curved handle to the figure of a bird upon the opposite chamber. The whistling apparatus is on the outside of the bird's head. Two notes are emitted, as follows:

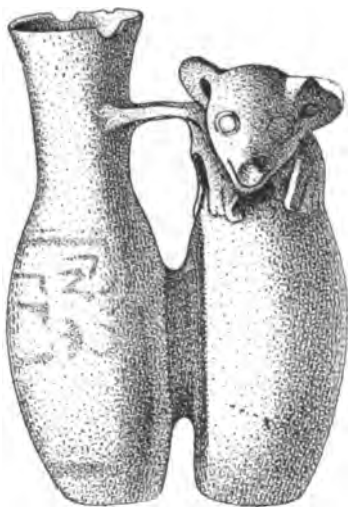


Fig. 315.

WHISTLING VASE, PAINTED WARE, ANIMAL
FIGURE, TWO CHAMBERS.

Peru.

Cat. No. 32258, U.S.N.M. $\frac{1}{2}$ natural size.

Fig. 315 represents a double bottle of painted ware. The ground color is pale yellow and the decorations consist of conventional designs in brown and red. A figure of an animal is united to the neck of the bottle by a nearly straight handle. The shape of this vessel differs from all others, the chambers being more like a modern flask or canteen. Its one note is here given:



Specimen, Cat. No. 88210 (U.S.N.M.), from Peru, received from Mr. W. W. Evans, is a double bottle of painted ware.

The ground color is light red, upon which are decorations in pale yellow and purple. One half of the vessel represents a grotesque human figure in a squatting position. Part of the head is in the form of a bird, and it contains the whistling mechanism. A curved handle projects from the back of the head connecting with the neck of the bottle. The one note emitted is quite weak:



In fig. 316 is shown a double bottle of painted ware. The decoration consists of stripes of red upon a pale yellow ground. A narrow band ornament in relief encircles the bottle proper. The connecting vessel

¹ A series of whistling vases (vases sifflants), identical with the one here described, is given by Wiener in "Perou et Bolivie," p. 628.

chamber represents a human figure kneeling. The left hand holds the mouth an instrument evidently intended to represent a syrinx or an pipe. A vessel similar to the foregoing, but without the whistling attachment, is described and figured by Wiener in "Perou et Bolivie" p. 623). Attached to the right hand is a gourd-shaped object, possibly

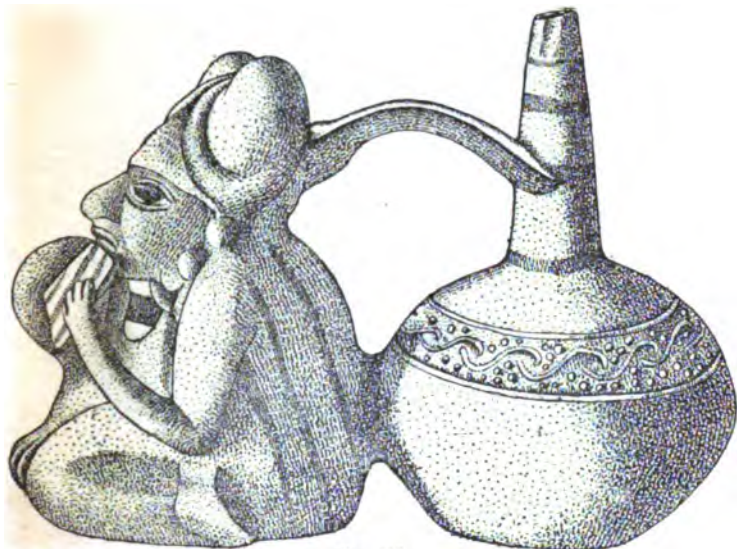


Fig. 316.

DOUBLE WHISTLING VASE, PAINTED WARE, BAND ORNAMENTED IN RELIEF, HUMAN FIGURE.

Peru.

Cat. No. 1399, U.S.N.M., $\frac{3}{4}$ natural size.

rattle. The whistling apparatus is at the back of the head, where the curved handle which connects with the mouth of the bottle is joined. Its two notes are indicated in the accompanying scale:



Increased force in blowing produces the higher tone.

Another example of this class, shown in fig. 317, is a highly ornamented specimen of painted ware. The ground color is pale yellow and the decoration is in red, brown, and white. There are sunken panels on opposite sides of each bottle, in which are delineated an animal figure in relief. The animal represented is the same in each panel. A handle ornamented with painted geometric designs joins the two necks. Unfortunately the animal figure which contained the whistle is mutilated and no note can be produced.

Fig. 318 represents a vessel from an ancient grave in Peru, presented by the late secretary of the Smithsonian Institution, Prof. S. F. Baird. It is a double bottle of polished black ware. The two bodies of the vessel are ornamented with small indentations or eyes, which suggest

the idea that potatoes were intended to be represented. This does seem unusual, for the ancient Peruvians reproduced in clay the fig-



Fig. 317.

DOUBLE WHISTLING VASE, PAINTED WARE, ANIMAL FIGURE IN RELIEF.

Cheperi, Province of Pacasmayo, Peru.

Cat. No. 107548, U.S.N.M. $\frac{2}{3}$ natural size.

of men, animals, birds, fishes, shells, fruits, and vegetables. It is also well known that the potato was cultivated extensively in Peru at the time of the early discoveries.¹



Fig. 318.

DOUBLE VASE, POLISHED BLACK WARE.

Ancient grave, Peru.

Cat. No. 15719, U.S.N.M. $\frac{2}{3}$ natural size.

The necks of the vessels are connected by a thin, straight handle.

¹ Prescott, Conquest of Peru, I, p. 141.

The usual animal or bird shaped figure containing the whistle is missing, therefore its musical capacity is unknown.

In fig. 319 is illustrated a double bottle of polished black ware. The figure of a bird is seated on one projection. At the back of its head is the air passage and venthole forming the whistle. On the connecting handle are two panel-like designs, with animals and birds represented in relief. Its two notes are indicated in the accompanying scale:



Fig. 320 represents a double bottle of polished black ware. The upper portions of the vessel are encircled by three bands, highly ornamented in relief. In the lower band birds are delineated, the next



Fig. 319.

DOUBLE WHISTLING VASE, POLISHED BLACK WARE, FIGURE OF BIRD.

Peru, Tryon collection.

Cat. No. 148015, U.S.N.M. $\frac{1}{2}$ natural size.

higher fishes, and on the upper one the meander or Greek fret. On the connecting handle between the two projections are two panels, with conventional designs of animals, etc., also in relief. Seated upon one neck or projection is a monkey-like figure, with openings in the body, arranged in the usual manner, to produce a whistling sound or note, which is here given:



Specimen, Cat. No. 1405 (U.S.N.M.) was obtained in Peru by Admiral Charles Wilkes, United States Exploring Expedition. It is a double bottle of black ware. One portion represents an animal, with the

whistling mechanism in its head. There are small openings in the ears, nostrils, and mouth of the figure, which allow the air to escape, but the whistle itself can not be seen. Two notes can be obtained, as shown in the following scale—the higher note by increased force in blowing:



Specimen, Cat. No. 1347 (U.S.N.M.), from Peru, presented by Mr. W. Cartwright, is a double bottle of polished black ware, with a horizontal connecting handle between the two projections. Upon one of



Fig. 320.

DOUBLE WHISTLING VASE, BLACK WARE, BAND DECORATION IN RELIEF.

Cheperi, Province of Pacasmayo, Peru

Cat. No. 107552, U.S.N.M. $\frac{1}{2}$ natural size.

these is represented a monkey-like figure. The bottom of one chamber is broken, and no sound can be produced.

Specimen, Cat. No. 68102 (U.S.N.M.) was exhumed from a mound or tomb near Catacaos, Peru, collected by Mr. W. F. Lee. It is bird shaped and made of dark gray colored clay, slightly polished. The head is parrot-like, and the plumage markings are indicated in conventional style by lines and dots in relief. The spout rises from the body near the tail, and is connected by a curved handle with the bird's head. Near this point of contact the handle is enlarged and contains the air passage, venthole, etc., which are necessary to obtain a sound or note. The specimen, however, is mutilated to such an extent that no musical sound can be produced.

Bird-shaped whistles.—Fig. 321 represents the only example in the United States National Museum from Peru of a bird-shaped whistle identical in all respects with the Mexican and Central American instruments. It was presented by Col. J. S. Billings, surgeon, United States Army, and forms part of a series of objects obtained by him from an ancient grave in the mountains near Lima. It is of reddish clay, slightly polished. The painted decoration is quite simple, the wings only being outlined in black. There are two sound holes, one on each side, near the middle of the body. Part of the tail, which contained the mouthpiece, is wanting, but enough remains to obtain the musical compass of the instrument, which is here given:



Specimen, Cat. No. 107434 (U.S.N.M.) is a bird-shaped whistle or toy of coarse clay, painted black and polished. The plumage markings are indicated by incised lines alternately touched with white and red pigments. It was obtained from an ancient grave near Ancon, and presented by Mr. W. H. Jones. The body of the bird is hollow, and there is but one hole, placed in the back. To produce a sound it must be



Fig. 321.

POTTERY WHISTLE, BIRD-SHAPED.
Ancient grave near Lima, Peru.
Cat. No. 140975, U.S.N.M. $\frac{3}{4}$ natural size.

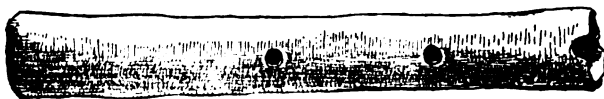


Fig. 322.

FRAGMENT OF A BONE FLAGEOLET.
Ancient grave near Lima, Peru.
Cat. No. 140983, U.S.N.M. $\frac{3}{4}$ natural size.

blown in the same manner as a flute. It may not have been intended for anything but a call or signal. The following note is emitted:



Specimen, Cat. No. 140983, U.S.N.M., is a bone bird-shaped whistle of the same general form and method of construction as the one just described. It was obtained by Col. J. S. Billings from the grave near Lima, and found with the bird-shaped instrument shown in fig. 321.

Bone flute.—An interesting object of bone from the same grave is represented in fig. 322. It is part of the ulna of the Brown Pelican (*Pelecanus molinae*). The ends of the bone have been cut off and the

cellular portion removed. In its original condition this instrument was probably furnished with four finger holes, as were some of the whistles or flutes from the California islands previously mentioned (p. 570, fig. 210), and to which it bears a remarkable resemblance. This one is unfortunately broken off at the third hole. Wiener, speaking of this class of instruments, says:

The most curious objects of this kind are, without contradiction, the flutes of the tibia or other bones of birds, many times covered with designs (incised).

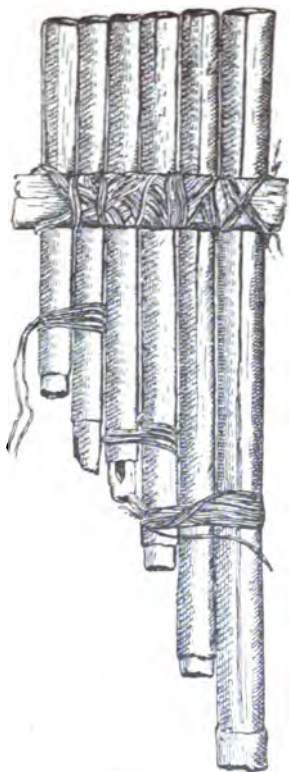


Fig. 323.

SYRX OR PAN-PIPE (*huayrapuhura*), COMPOSED OF SIX REEDS.

Grave near the beach at Arica, Peru.

Cat. No. 136969, U.S.N.M. $\frac{1}{2}$ natural size.

Syrinx or *Pan-pipes* (reed and stone).—Two interesting specimens made of hollow reeds, representing the syrx or Pan-pipes (*huayrapuhura*) are preserved in the National Museum. They were obtained by Ensign W. E. Safford, United States Navy, from ancient burial places near Arica, Peru. The reeds are of graduated lengths, lashed together by threads and held in place by a piece

of split reed fastened transversely to their length. The reeds are so crushed and mutilated that a positive sound can not be obtained. These instruments are illustrated in figs. 323 and 324. One is composed of six reeds, the other of five. In the graves, associated with them, were flint arrowheads, stone sinkers, copper knives and fishhooks, objects of bone, wood, and pottery, woven matting, and the mummified body of a young man. That instruments of this kind are of ancient origin and were in use

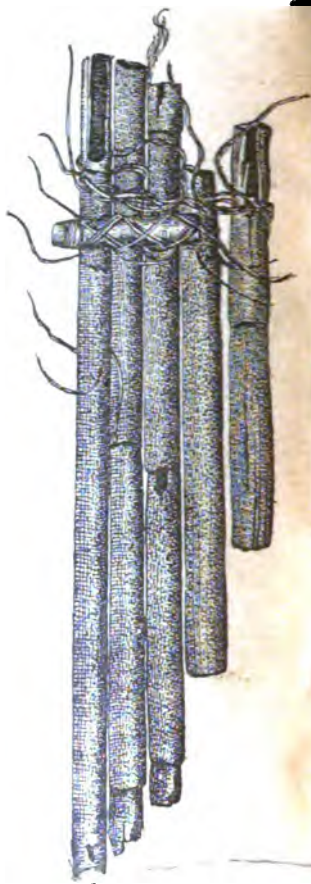


Fig. 324.

SYRX OR PAN-PIPE, COMPOSED OF FIVE REEDS.

Grave near the beach at Arica, Peru.

Cat. No. 129385, U.S.N.M. $\frac{1}{2}$ natural size.

¹ Perou et Bolivie, p. 581.

y the Peruvians before the Spanish conquest is shown by the historian Garcilasso de la Vega.¹ Of their music he says:

In music they arrived to a certain harmony, in which the Indians of Colla did more particularly excel, having been the inventors of a certain pipe made of canes tied together, every one of which having a different note of higher and lower, in the manner of organs, made a pleasing music by the dissonancy of sounds, the treble, tenor, and bass, exactly corresponding and answering to each other; with these pipes they often played in concert, and made tolerable music, though they wanted the quavers, semiquavers, airs, and many voices which perfect the harmony among us. They had, also, other pipes which were flutes, with four or five stops, like the pipes of shepherds.

Rivero and Von Tschudi² mention similar instruments made of reeds of cane or stone and adorned sometimes with needlework.

Fig. 325 represents an instrument made of stone. It is reproduced from Engel's drawing,³ and his description here follows:

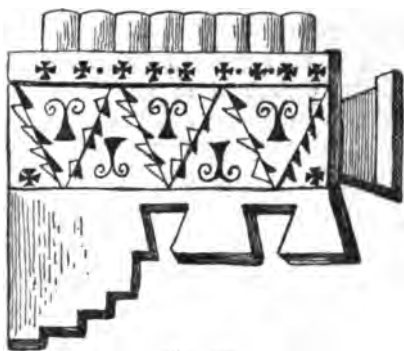
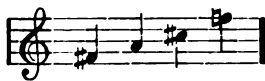
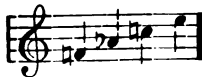


Fig. 325.
SYRINX OF STONE.
Peruvian grave.
Engel, Musical Instruments, p. 66.

Another huyara-puhura, likewise still yielding sounds, was discovered placed over a corpse in a Peruvian tomb, and was procured by the French general, Paroissien. This instrument is made of a greenish stone, which is a species of talc, and contains eight pipes. In the Berlin Museum may be seen a good plaster cast taken from this curious relic. The height is 5½ inches, and its width 6½ inches. Four of the tubes have small lateral finger-holes, which, when closed, lower the pitch a semitone. These holes are on the second, fourth, sixth, and seventh pipes, as shown in the engraving. When the holes are open, the tones are:



and when they are closed:



The other tubes have unalterable tones. The following notation exhibits all the tones producible on the instrument:



The musician is likely to speculate what could have induced the Peruvians to adopt so strange a series of intervals; it seems rather arbitrary than meditated.

The Peruvians tied knots in strings to record their music.⁴

¹Commentaries of Peru: English translation by Sir Paul Rycant, Kt., London, 1688, Book II, p. 84.

²Peruvian Antiquities, English translation by Francis L. Hawks, D. D., LL. D., p. 143, et seq.

³Musical Instruments, p. 66.

⁴Rowbotham, History of Music, III, p. 198, citing de la Vega, II, p. 27.

CONCLUSION.

Certain differences of opinion exist among historians of music as to the scale adopted by primitive peoples in their earliest efforts. One class thinks it finds in the laws of sound a relationship between notes of different pitch, which harmonize with each other and make a concord of sweet sounds, and demonstrates a scale natural to all men and therefore universal, applying as well to the savage as to the enlightened; that is to say, they believe that when the savage has become sufficiently practiced in music to employ a scale of any kind, he will use that belonging to modern and civilized music because that scale is natural to man. Other persons deny this, and express their belief that primitive peoples either did not recognize this concord, or else did not desire it.

These differences of opinion have not been adjusted. When one party shows primitive instruments on which the modern scale can be produced, or shows primitive music written on the modern staff, they are met with the assertion that this is, or may be, the result of straining the instrument to produce the given note.

Neither myself nor my associate, Mr. Upham, have taken sides in this controversy, recognizing our rôle to be that of gathering facts rather than indulging in speculation, that our facts may be used by both parties, thus serving in some degree to elucidate these disputed questions.

Great care has been employed in ascertaining the tones or pitch indicated in the staves, that they should represent the normal scale of each instrument. They could be manipulated so as to give a tone higher or lower than normal. Particular pains have been taken to represent upon the staff the notes obtained, by using average force in blowing, and to avoid the temptation to raise or lower the pitch, in order that the intervals might be more easily represented on the staff or more satisfying to the ear.

The fact that it is rare to find two instruments from a given locality which produce the same tones indicates at least that their construction (musically) was not based on any established or recognized scale. With most of them the intervals and scale appear to have been purely accidental. What results might be obtained if all prehistoric instruments could be brought together and studied it is impossible to say.

AN ANALYSIS OF THE DECORATIONS UPON POTTERY FROM THE MISSISSIPPI VALLEY.

THE ceramic art of the Mississippi valley, so far as it relates to the pottery from the tumuli of Missouri, Arkansas, and portions of some of the adjoining States, seems to be indigenous to that region, and the evolution of both form and ornament can be more readily traced in specimens from these localities than in the more highly developed pottery of the Pueblo region, Mexico, or Central America. Archaic designs upon basketry seem to have had no influence upon the ornamentation of the Mound pottery. The decorative motives are mostly of symbolic origin, and were evidently closely associated with the religious beliefs and ceremonies of the people.

Many of the symbols from which were evolved the artistic designs upon this pottery have been in use among various tribes within the historic period from the Great Lakes to Mexico, and while the interpretation of the same sign among different tribes is not always the same, the different meanings applied to the same symbol usually indicate a common root.

Several of the symbols carved upon the shell gorgets from the Mississippi valley also constitute an important part of the designs upon pottery, and, although they are somewhat modified in form, they are easily recognized. The animal forms upon this class of gorgets—the spider, the serpent, and the bird—rarely occur as decorative designs upon the pottery. We find present the geometric

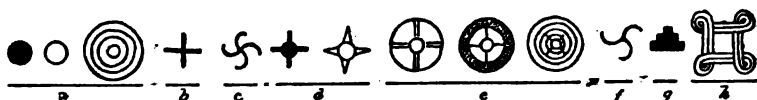


FIG. 1. Symbols from which were derived most of the decorations upon the Mound pottery of the Mississippi valley. *a.* Sun symbols; *b.* Symbol of the four directions and the four winds; *c.* American swastika or four-wind symbol; *d.* Symbols of the sun and four winds; *e.* Cosmic symbols; *f.* American triskele; *g.* Cloud symbol; *h.* Looped band.

symbols which commonly accompany the animal forms,—the concentric circles, the cross inclosed within the circle, and the looped bands, together with the swastika and the triskele.

In Fig. 1 we have a series of drawings illustrating the symbols from which a great majority of the painted and incised decorations probably originated. The following interpretations of some of these signs are those most commonly applied by historic tribes.

The disk, the circle,¹ and the concentric circles *a*, are sun symbols,

¹ The circle is also the totem of the Tüwa gens of the sand or earth people of Tusayan, and represents the horizon. See "Tusayan Totemic Signatures," J. W. Fewkes, *The American Anthropologist*, vol. x. No. 1, January, 1897.

the first two being still in use among the Omahas, and the third is a sun symbol of the Ojibwas. The latter, slightly modified, also appears upon the Post-Columbian Mexican manuscript discovered by Mrs. Nuttall in the Florence Library, and is also designated as a sun symbol. It seems probable that this design, which we find carved upon shell, painted upon pottery, and occasionally wrought in copper, was closely associated in prehistoric times with sun or fire worship. Sun worship, as is well known, constituted an important part of the religion of the historic tribes of the central Mississippi region.

The equal-armed cross, *b*, is widely distributed over America, and among historic tribes usually symbolizes the four cardinal points, or the four winds. Among the Pueblo tribes, however, it is a star symbol. The American ogee swastika, *c*, is also widely distributed, and is recognized as a wind symbol by various tribes. Its evolution from the equal-armed cross inclosed within a circle can be traced independently in different localities. Combinations of the simpler sun signs and the symbol of the four winds will be recognized in *d*. Miss Alice C. Fletcher informs me that these symbols are still in use among the Omahas and Sioux as the sun and four-wind signs.

The drawings in Fig. 1, *e*, are cosmic symbols representing the sun, the four winds, and the horizon. The two at the right show in addition the waters which encircle the earth. The world of primitive man was bounded by the horizon, — an immense circle over which the sun daily took its course, establishing the cardinal points, the recognition of which forms so conspicuous a part of the religious ceremonies of the Indians.

When man desired to represent symbolically the world as known to him, he drew a circle representing the horizon, in the centre of which he placed a smaller circle symbolic of the sun in the zenith. From the central sun symbol four lines were drawn to the outer circle, dividing it into four equal parts, these lines representing the four world-quarters and the four winds. Many figures of the sun occur inclosing an equal-armed cross. It should be borne in mind that the centre of the sun when in the zenith is the point where the four arms forming the cross are supposed to meet, and that the sun and the four directions may be represented with the arms projecting from a disk or circle, as in Fig. 1, *d*; or the circle may inclose the cross, as in Fig. 9, *a*, *b*, *c*, and *d*.

In addition to the cosmic symbol as illustrated in *e*, Fig. 1, four dots or circles sometimes occupy the spaces between the arms of the cross, — one near the centre of each quadrant.

This symbol and its derivatives, the sun sign in its various forms, the equal-armed cross, and the swastika, have been found among

the remains of the great earthwork-builders of the Ohio valley, some of them cut from native copper,¹ and with the exception of the swastika they are represented in the great earthworks themselves. This symbol extends from Ohio southward throughout the southern portions of the United States and into Mexico and Central America, where it is common in the codices, upon pottery, and upon the sculptural remains.

The cosmic sign is generally considered a sun or day symbol when occurring in the Maya manuscripts. As a day sign its meaning is clear, but as a simple sun sign its original significance is but imperfectly applied. An interesting example of this sign is to be found in the Mexican manuscript already referred to (Fig. 1, *e*, middle drawing). In the original the central sun disk is colored a bright yellow, and the outer zone, symbolizing the waters which surround the earth, is painted blue. The drawing at the right (Fig. 1, *e*) is a modern symbol of the sun, earth, water, and four winds.²

The triskele, *f*, frequently occurs upon pottery and other objects from the Mississippi valley. It is also found in the Pueblo region, Mexico, and Central America. It is often associated with the swastika, and in the north seems occasionally to be substituted for that sign. I know of no satisfactory explanation of its significance.

The terraced figure, *g*, is a well-known design of both the ancient and modern Pueblo Indians. Dr. Fewkes informs me that among the Mokis it is a cloud symbol. It seems probable that a similar meaning was applied to this design by the Mound-builders, as it is frequently associated with the wind symbol upon Mound pottery.

The looped band, *h*, which occurs in connection with the four heads of birds upon shell gorgets, is also found upon the pottery, and occasionally forms a symbolic ornament around bird-shaped bowls.

Having thus briefly described the symbols from which were probably derived most of the decorations upon the pottery, I will call attention to the occurrence of some of these forms in connection with sun worship among the historic Indians of the region where many of the specimens illustrated were obtained.

During the visit of Thomas Ashe in 1806 to the Indian village of

¹ For examples of the cosmic symbol from Ohio see "Symbolism in Ancient American Art" (abstract), by F. W. Putnam and C. C. Willoughby: *Proceedings of the American Association for the Advancement of Science*, vol. xlv. 1896.

² Alice C. Fletcher, "The White Buffalo Festival of the Uncpapas:" *Peabody Museum Reports*, vol. iii. pp. 264, 265.

Ozak in Arkansas, he witnessed one of the quarterly sun ceremonies performed by the inhabitants. The following is condensed from Ashe's account :—

The natives divided into classes, each class standing in the form of a quadrant, and each class held an offering to the sun the instant he rose. The warriors presented their arms, the young men and women offered ears of corn and the branches of trees, and the mar-

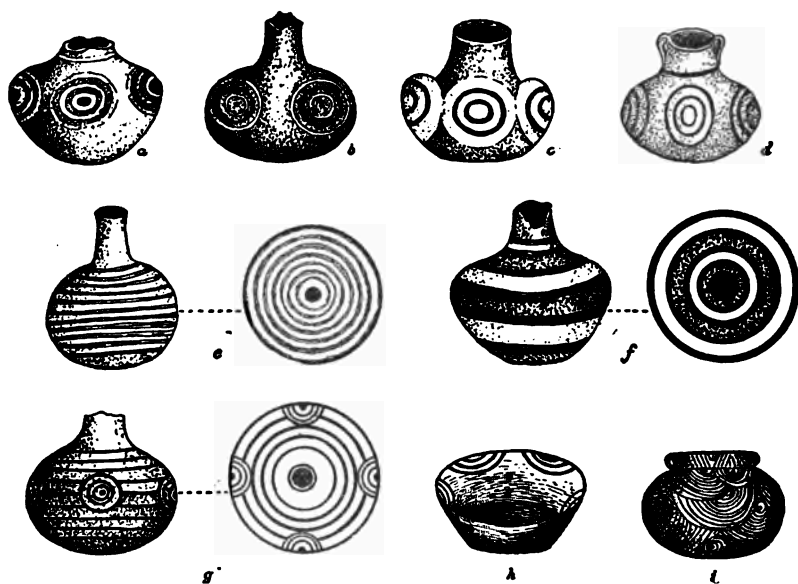


FIG. 2. Pottery with decorations derived from the sun symbol, composed of concentric circles. a-h. Missouri; i. Arkansas. a, c, e, f, g, and i. Peabody Museum; b, d, and h. St. Louis Academy.

ried women held up to his light the infant children. Immediately after this address the four quadrants formed one immense circle several deep, and danced and sung till about ten o'clock, and then dispersed. At noon they again assembled and formed a number of circles, and commenced the adoration of the midday sun, after which a feast was prepared. Then they reposed until the sun was about to set, which being reported by watchers, the people assembled in haste, formed themselves into segments of circles, and presented their offerings during his descent. When the sun does not shine or appear on the adoration day, an immense fire is erected, around which the ceremonies are performed with equal devotion and care.¹

We are not informed as to the relative positions of the four quadrants, but it is probable that their right angles were placed near

¹ Thomas Ashe, *Travels in America*, pp. 305-308.

together, forming thereby the equal-armed cross within a circle. This figure together with others formed by the people during the ceremony, the immense circle and the (concentric?) circles, are the same as the sun sign and other symbols appearing upon pottery and other objects throughout the region. The resemblance of the figures to the symbols is more striking if we imagine the circles and quadrants to be formed around an immense fire, symbolic of the sun, upon days when the sun does not appear, as mentioned by Ashe.

A series of well-made pottery vessels with both painted and incised decorations is shown in Fig. 2; *a*, *b*, *c*, and *d* each have four groups of concentric circles placed around the body of the vase, — one group for each world-quarter. In *e* and *f* the rings are placed hori-

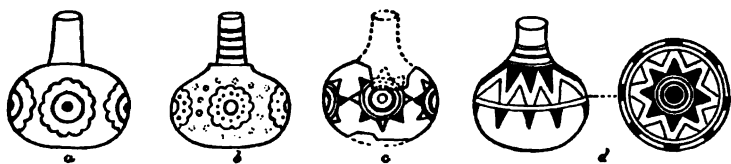


FIG. 3. Vases decorated with sun symbols. *a* and *b*. Peabody Museum; *c* and *d*. St. Louis Academy. Mounds of Missouri.

zontally, and the significance of the decoration appears only when viewing the vessel from above or below. In *g* we have both a vertical and a horizontal arrangement of the circles. The decorations of the vessels *h* and *i* are derived directly from the sun symbols, the inner margin of the bowl being decorated with groups composed of several semicircles, or one half of the sun symbol. The incised decoration of *i* is also composed principally of concentric circles. The

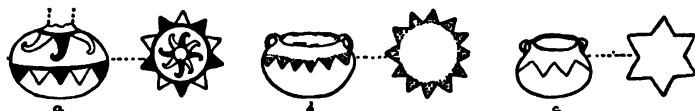


FIG. 4. *a*. Vase decorated with design derived from the sun and four-wind symbols. The ornamentation upon *b* and *c* is probably derived from the rays of the sun. Peabody Museum. Mounds of Missouri.

simple disk, usually colored red, is found upon the bottom of a number of vases, generally in company with the design derived from the swastika, or wind symbol. See Fig. 16, *b*.

A series of vases having similar decorations to those in Fig. 2 is shown in Fig. 3. These have in addition rays or scallops projecting from or surrounding the outer ring. The symbols are arranged in groups of four upon the first three specimens. The decoration of the fourth example, *d*, consists of a single sun symbol with beams

radiating from a circle at the base of the neck of the vessel. The incised decorations upon *b* and *c*, Fig. 4, are apparently derived from the rays of the sun, as is also the design encircling the body of the vase illustrated in *a*. The motive of the decoration at the base of the neck of the same vessel is the swastika, the two figures forming a combination of the sun and four-wind symbols.



FIG. 5. Vase decorated with design derived from sun symbol. Peabody Museum. Missouri.

Other decorations, probably derived from the sun, or sun and four-wind symbols, are illustrated in Figs. 5 and 6. The design upon the long-necked vase shown in Fig. 5 consists of a circle surrounding the body of the vase, from which upon either side project rays. The more intricate incised decoration upon the vessel illustrated in Fig. 6 is composed of six symbols, four of which have four rays each. The two upper examples

each have five rays.

Another modification of the same motive will be seen in the examples illustrated in Fig. 7. Painted circles inclose the neck of the vases. From the lower circle in *a* four symbolic arms project downward, terminating at the rim of the base. Upon the base of *b* a disk is painted, from which spring the four arms which rise towards the neck, terminating a short distance from the lower ring. The



Fig. 6. Vase with incised decorations, probably derived from the symbol of the sun or sun and four directions. The six symbols which compose the decoration upon the vase are also shown. Peabody Museum. Arkansas.

specimen shown in *c* has a single ring near the neck and another at the base. Four bands connect these rings, forming a design closely resembling the cosmic symbol. In *a* and *b*, Fig. 8, the same general design appears with additional connecting bands. In these

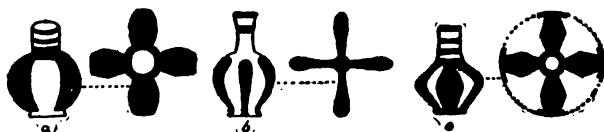


FIG. 7. *a* and *b*. Vases decorated with symbols of the sun and four directions; *c*. Vase with cosmic symbol as a decorative motive. *a*. Missouri. *b* and *c*. Arkansas. Peabody Museum.

specimens symbolism appears to be subordinate to æstheticism. In the beautiful example illustrated in *c*, the circles and rays appear upon the neck, — the decorations upon the body of the vase being

apparently evolved from the original four perpendicular bands shown in Fig. 7.

Upon the vases illustrated in Fig. 9 is drawn a series of designs

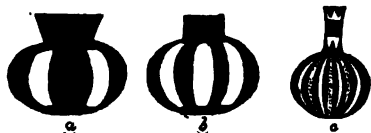


FIG. 8. Vases with decorations probably derived from the symbol of the sun and four directions. *a* and *b*. Arkansas. Peabody Museum. *c*. Missouri.

closely resembling some of those previously described. These, with the exception of *c*, have in addition an equal-armed cross inclosed by the inner circle. In *a*, *b*, and *d*, the symbols are arranged in groups of four.

An examination of the bird gorgets in the Peabody Museum,¹ from the stone graves of Tennessee, shows that the sun symbol

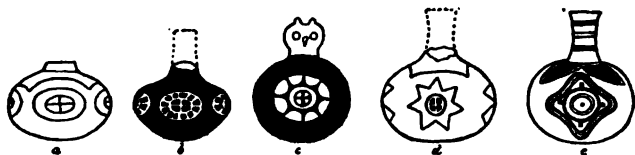


FIG. 9. Vases decorated with designs derived from the symbol of the sun and four directions. *a*, *b*, and *c*. Missouri. St. Louis Academy. *c*. Kentucky; *d*. Missouri. Peabody Museum.

which forms the centre of the design is either a dot inclosed within a circle, or the more elaborate design of circles with rays inclosing an equal-armed cross, and, as before stated, the centre of the sun when in the zenith is the point where the lines of the four directions meet, and the sun and four directions may be represented both as

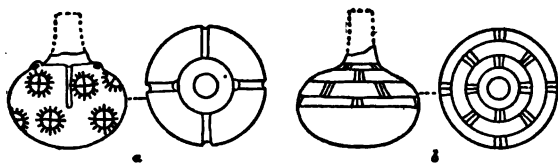


FIG. 10. Vases decorated with designs derived from the symbol of the sun and four directions and the cosmic symbol. Missouri. Peabody Museum.

a disk or circle with radiating arms, or a circle inclosing an equal-armed cross. As previously noted, the equal-armed cross is a star symbol among the modern Pueblo tribes, but the evidence does

¹ Examples of these gorgets are illustrated in the second volume of the Reports of the Bureau of Ethnology, plates lviii. and lix.

not indicate that it was so regarded by the early tribes of the Mississippi valley.

The vase at the left in Fig. 10 is decorated with a number of circles, each inclosing an equal-armed cross, and each surrounded by rays. The vessel has also four grooves projecting downwards from near the base of the neck, dividing the vase into quarters. Upon the specimen at the right in the illustration has been painted a design in circles, connected, and divided into quarters, by upright lines. This design, when viewed from above, resembles the cosmic symbol.

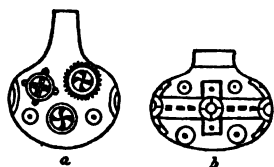


FIG. 11. Vases decorated with designs derived from the sun symbols, the symbol of the four winds, and the cosmic symbol.
a. Missouri. St. Louis Academy.
b. Missouri. Peabody Museum.

The design upon the vase illustrated in Fig. 11, *b*, consists of four cosmic symbols placed at equal intervals and connected by broad bands. Above and below each symbol is placed a wide, projecting arm, which, together with the half of the segment of the encircling band upon either side of the symbol, forms a cross. Circles inclosing disks are placed in the angles between the arms.

The accompanying drawing, *a*, illustrates a vase decorated with circles inclosing disks, straight-armed crosses, and swastikas. In the upper left design the arms of the cross project beyond the outer sun circles. This figure is an excellent illustration of the combination of the two forms of the sign of the sun and four directions, — the circle encircling the cross, and the circle with the four radiating arms.

Fig. 12, *a*, is a drawing of a small shell gorget from Missouri. It

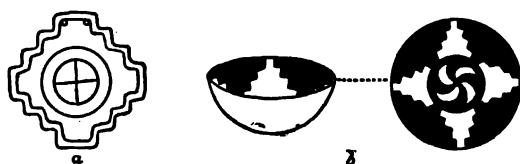


FIG. 12. *a.* Shell gorget. Missouri. *b.* Bowl decorated with terraced figures and swastika, symbols of the clouds and the four winds. Arkansas. Peabody Museum.

is in the form of a cross, each arm being composed of a terraced figure. In the centre of the gorget are two concentric circles inclosing a cross.

The bowl shown in *b* has a similar design painted upon the inner side, the swastika taking the place of the straight-armed cross and the inner circle in the centre of the gorget. The swastika, or four-wind symbol, associated with the terraced figure, emblem of the clouds which bring the wind, also forms the decoration upon vases from the mounds, an example of the combination being illus-

trated in Fig. 17, *d*. Specimens are not uncommon where the ornamentation is composed wholly of terraced figures, usually, though not always, arranged in groups of four. Examples are shown in Fig. 13.

Bowls with four terraced projections at the rim are occasionally found closely resembling in form the sacred-meal bowls of the Zulus.

In Figs. 14, 15, 16, and 17 we have a series of bowls and vases



FIG. 13. *a*. Vase decorated with terraced figures. Arkansas. Peabody Museum. *b*. Vase decorated with terraced figures. Arkansas. National Museum.

showing the evolution of the beautiful scroll-like designs so characteristic of the Mound pottery. Fig. 14, *a*, is a bowl about twelve inches in diameter, having a central disk from which radiate the four world-quarter arms; *b* is a bowl of about the same size as the latter, with

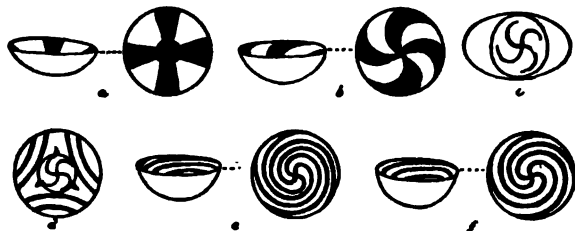


FIG. 14. *a*. Bowl decorated with the symbol of the sun and four directions; *b*. Bowl decorated with symbol of the four winds; *c*. Bottom of vase with swastika decoration; *d*. Bottom of vase with swastika decoration; *e* and *f*. Bowls with symbol of the four winds or swastika. All from Arkansas. Peabody Museum.

the swastika occupying its inner surface; *c* shows the bottom of a small vase of peculiar pattern with the swastika incised upon it; *d* shows the bottom of a vase with a painted swastika; *e* and *f* are bowls with swastika decorations, the curved arms of the crosses being much elongated.

Fig. 15 represents an artistically formed vase decorated with three swastikas, the ends of a portion of the arms being modified to fill the intervening undecorated spaces between the crosses.

Fig. 16 represents the next stage in the development of the scroll. In this example, as in the great majority of specimens of like design (see also Fig. 17), four swastikas are employed, and the ends of

the arms of the adjacent crosses are joined. Upon the bottom of this vase a sun disk is painted, and the arrangement of the arms of the swastikas is such as to make a cruciform pattern, which appears



FIG. 15. *a.* Vase decorated with three swastikas, the ends of some of the arms of the crosses being curved to fill the blank space on vase; *b.* The three swastikas forming the design upon the vase. Arkansas. Peabody Museum.

when the vase is viewed from below. This cruciform figure was originally accidental, and was taken advantage of by the decorator, and the sun disk, or in some instances the swastika, was added to complete the figure.

In Fig. 18, *b*, the vase is so constructed as to form a cross when

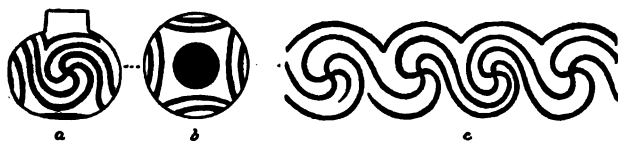


FIG. 16. *a.* Vase with swastika decorations, the ends of the arms of the crosses being joined; *b.* Vase seen from below, showing sun disk and cruciform figure formed by the lower arms of the swastikas; *c.* Design encircling the vase. Arkansas. Peabody Museum.

viewed from above or below. The examples illustrated in this figure have incised decorations and are unpainted. In *a* and *b* the designs are more purely decorative than those previously described, and additional arms are employed to complete the patterns. The



FIG. 17. Vases decorated with joined swastikas and other designs. Upon the neck of *d* four terraced cloud figures are painted, and the legs of the vessel are also terraced. Arkansas. Peabody Museum.

reason for the multiplication of the arms of the cross is apparent. The incised lines occupy so much less space than the broad arms of the painted designs that other arms were added to fill the remaining spaces, and the symbolic features became subservient to the decoration.



FIG. 18. Vases decorated with incised designs derived from the swastika, or four-wind symbol. *a* and *b* show both the sides and under part of vases. *a* and *c*. Arkansas. Peabody Museum. *b*. Mississippi. Peabody Museum.

Other designs derived from the swastika are shown in Fig. 19. Three scrolls, each formed of one half of this cross, compose the decorations upon vase *a*. The interlocked curved arms appearing in white near the centre of the drawing, inclosed within the curves of the S-shaped design in black, are identical with the interlocked scroll so common upon the ancient pottery from Arizona and New Mexico.

A further development of this pattern will be seen in the vase illustrated in *b*. The design upon the right side of the vessel, which is derived from the swastika, is represented in black, the interlocked arms appearing in white as before. The black line forming the scroll at the left is broken, the ends interlocking, and the continuous S-shaped figure, originally in black, now appears in white. This is another feature in common with the ancient Pueblo design.

The artistic decoration upon the vase illustrated in *d* is also derived from the S-shaped line forming one half of a swastika.



FIG. 19. *a*. Vase decorated with designs composed of one half of the swastika. Arkansas. Peabody Museum. *b*. Vase decorated with design derived from the swastika. Arkansas. National Museum. *c*. Vase with decoration derived from the swastika. Arkansas. Peabody Museum. *d*. Same as *c*, showing development of ornament.

This will be better understood by examining the drawing *c*, which shows the first stage of the decoration. The ends of the S-shaped line are expanded, and form the ornaments upon the top and bottom of the vessel. To complete the decoration the spaces upon either side of the S-shaped line were filled with contrasting colors, red and white. This design is duplicated upon the side not shown in the drawing.

Examples of the triskele are illustrated in Fig. 20, and upon the vase shown in *e*, Fig. 17. While less common than the swastika, the triskele is extensively distributed over America, and is found as far south as Copan, Honduras. There seems to be an intimate connection between this symbol and the swastika.

In Fig. 21 vessels with both painted and incised designs are shown, the motive of which is the looped band found in connection with birds' heads and the symbol of the sun upon shell gorgets from Tennessee. One of the bowls illustrated is in the form of a bird, and the looped band constitutes the decoration upon the outer side near the rim. The head of the bird is crested, which is also a noticeable feature of the birds' heads carved upon the gorgets.



FIG. 20. *a* and *b*. Bowl decorated with figure of the triskele. Arkansas. Peabody Museum. *c*. Under side of vase shown in *d*, Fig. 17. Arkansas. Peabody Museum.

The design upon the vase illustrated in *c* is the looped bands associated with circles inclosing disks, a simple form of the sun symbol. The design upon *d* will be recognized as the looped band combined with a pattern apparently derived from the swastika. Upon the gorgets we have the band, the birds' heads, and the sun all combined in one design. In the pottery are the following combina-

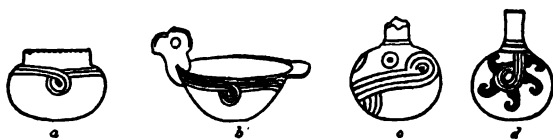


FIG. 21. Vessels decorated with the looped band, or the looped band combined with other designs. *a*, *c*, and *d*. Missouri. Peabody Museum. *b*. Missouri. National Museum.

tions: the band and the bird, the band and the sun, and the band and the modified swastika.

Interesting examples of Mound pottery are illustrated in the Third and Fourth Annual Reports of the Bureau of Ethnology, several of which are decorated with designs derived from the symbols described.

A comparison should also be made between the decorations upon the Mound pottery and the engraved gorgets illustrated in Mr. Holmes's article in the second volume of the same publication. My studies of this system of decoration are based upon the collections of pottery in the Peabody Museum.

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